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In This Issue—*What One State Association Did*

DEC 23 1921

MOTOR AGE

Vol. XL
Number 25

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, DECEMBER 22, 1921

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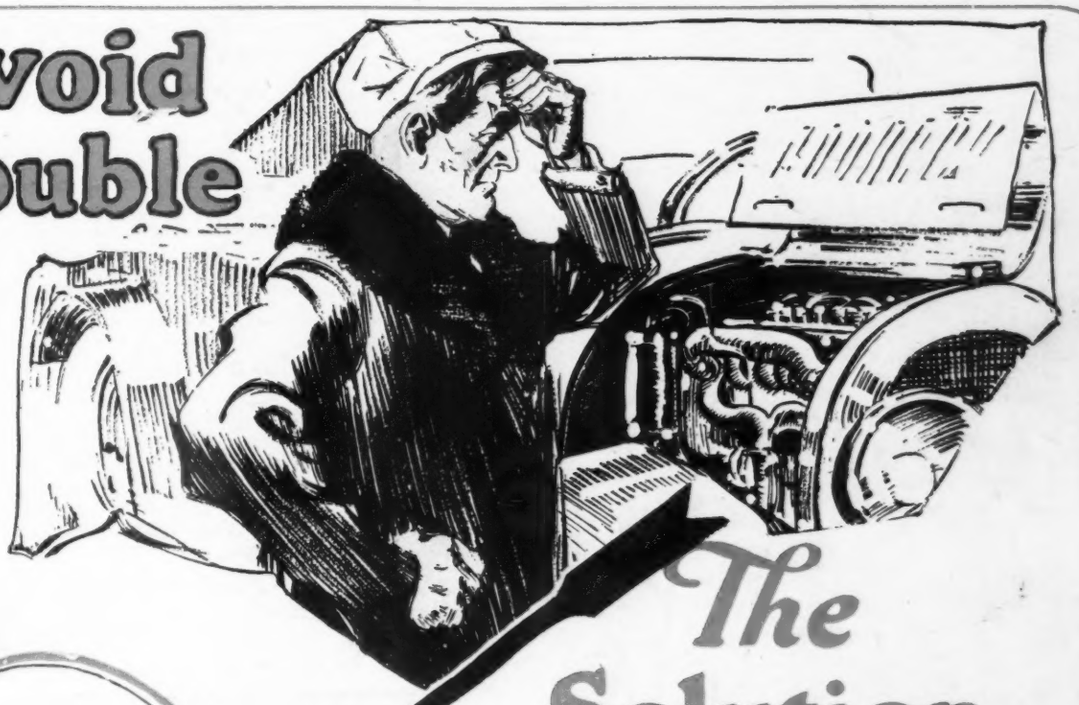

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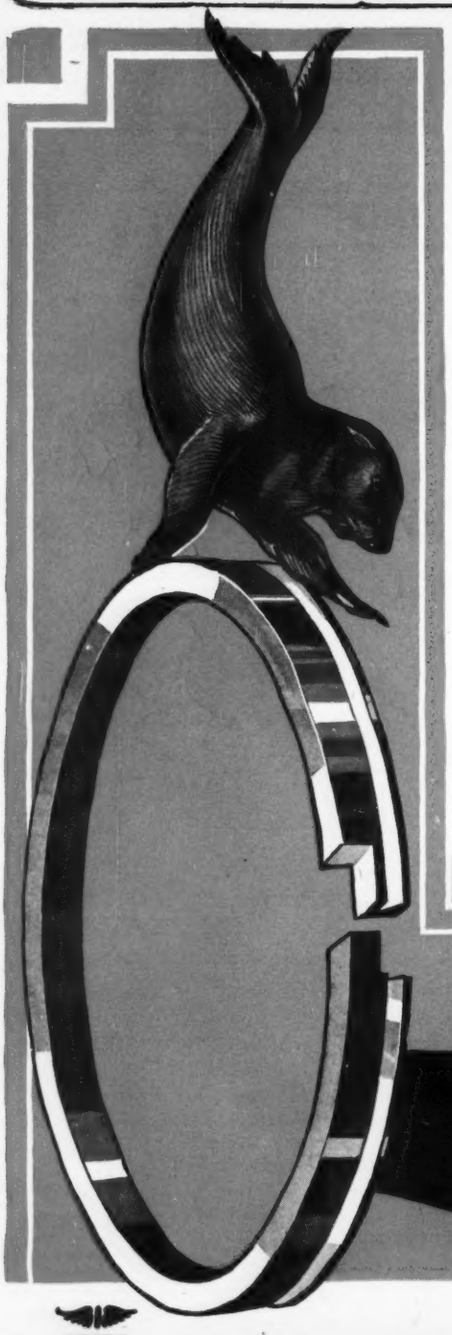

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AUTOMOTIVE EQUIPMENT ASSN.

MOTOR AGE

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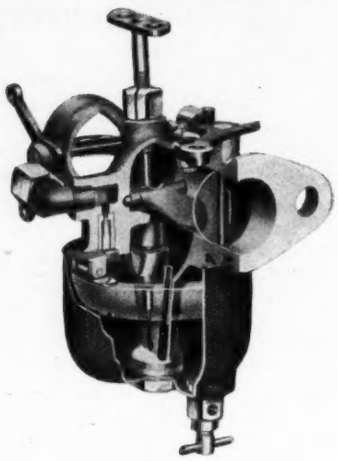
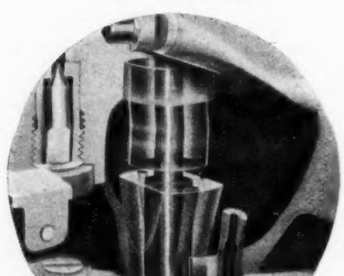


Cut-away view of the famous Kingston Model L 4, the NEW carburetor for Fords—simplest, staunchest and most efficient carburetor made.



Close-up view of the Kingston Model L-4 Spray Nozzle, the device that has made better carburetion possible. To be had ONLY on the new Kingston carburetor.

KINGSTON CARBURETORS

VOL. XL, No. 25 CHICAGO, DECEMBER 22, 1921 $3.00 Per Year

MOTOR AGE

How a State Automobile Trade Association Has

1 Cleaned Up Its Garages and Service Departments

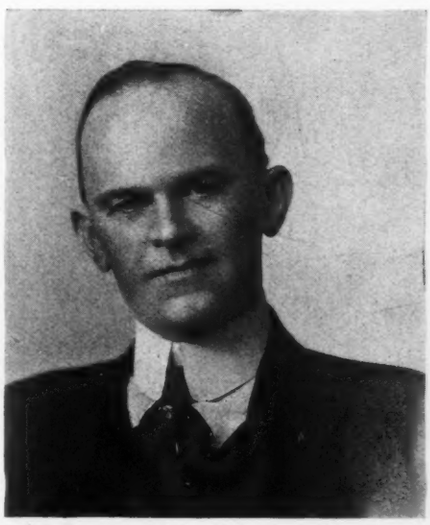
2 Raised Service Standards and Assured the Car Owner of Fair Prices and Good Work

3 Sold the Bankers and Business Men of Each Community on the Dignity and Worth of the Automotive Industry

RECOGNIZING the car owner as the real meal ticket of the automotive industry and knowing that only through his favor can it succeed, the California Automobile Trade Association, with 3000 members and 43 branches, has since its inception in 1915 continually educated its members to the absolute necessity of clean and attractive places of business and honest business methods.

The result of this effort has been astounding. The garage owners, service department executives and repairmen saw the logic of their association officers, and the untidy and therefore inefficient garage or service department is the exception all through the state. But just as it is necessary to keep unceasingly at it if the service is to be always clean, so it has been only through the never-ending propaganda of the association that the old conditions have never been allowed to creep back into practice.

This continual advertising of the clean shop idea and its ultimate general acceptance has had a remarkable influence on the morale of every employe and employer engaged in selling and servicing the product of a great industry. And all must come to it. Those who are slow to see it will be weeded out by the inexorable law of choice which the motorist is privileged to exercise.



Bob Martland, secretary and organizer of the California Automobile Trade Assn.

There is nothing mysterious or difficult in seeing why. The dirty floor, with pools of oil, the unwashed windows and dim light and the disarranged and greasy accessory corner are hang-overs from an early day and are rapidly passing. A few individuals tolerating these conditions in their businesses are finding the way increasingly difficult and will suffer complete elimination should they not see their mistake and correct it.

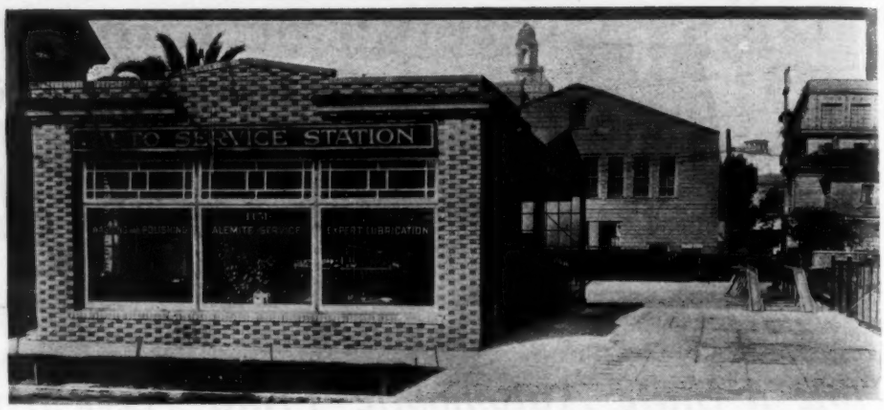
Women, in ever-increasing numbers, are driving cars, and they will not submit to doing business with a garage the slovenly appearance of which is not only abhorrent, but emphasizes the inefficiency that must result. And there is, indeed, nothing charitable in paying to have the garage or service department clean, well lighted and orderly. It is simply good business judgment and pays a handsome dividend in increased patronage and better work by the employes.

Large service departments can afford to employ a man whose only duty is to clean up and arrange tools and equipment. Smaller establishments obtain good results by assigning to each mechanic a certain space on the work bench and a specific area on the floor

for each job, and holding him responsible for the cleanliness of his space. This has been found to excite a spirit of pride and competition among the men and each man endeavors to keep his place the cleanest. The careless man soon feels out of place in such an establishment and either reforms or is necessarily discharged.

Clean and cheerful surroundings soon have their elevating influence on the morale of the employes and actual experience has proved that a sharp upward curve in efficiency can be looked for when the shop is kept clean, the windows washed regularly to admit more light and the walls and ceiling whitewashed or painted white.

Not only does it result in greater efficiency in the shop, but customers visiting the service department are favorably impressed with the conditions under which work is done on their cars.



Cleanliness and order greet the car owner in the average California garage or service department. One of the main reasons contributing to this condition is the work of the state automobile trade association. They started the clean up propaganda and the executives of the automobile concerns have found it good business. The service station shown above is the average rather than the exception

HOW CALIFORNIA ASSOCIATION HAS ACCOMPLISHED THE CLEAN SHOP

All state and local associations realize the benefits of a clean establishment, but are often in doubt as to how to go about selling the idea to members. Here is the method employed by the California Automobile Trade Association to spread the clean-up gospel. It can be used by any state association having county associations as its units. The California association is made up of a number of local county associations, each having its president and secretary-manager. The county unit is run on the principle of a local autonomy.

To put over the clean-up idea merely requires the compilation of material for the secretary-managers to preach to their community members. Many examples and much literature were distributed by the state organization. Some took the form of depicting the truth that a man will not buy his clothes in a filthy dry goods store or have his expensive watch repaired by a man who looks like a blacksmith.

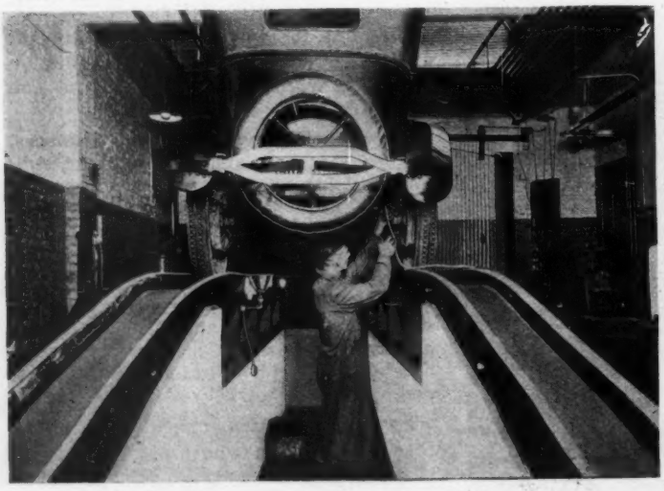
Secretary-managers were instructed to emphasize the necessity of a clean shop at every opportunity. Motorists were convinced through advertising that any place displaying the emblem of the association was reputable and would be found clean at all times. All of the members believe in the cause and carry out their beliefs to their ultimate profit and good-will-building result.

The Interesting History of the California Automobile Trade Association; How It Has Raised Service Ethics to a High Standard

THROUGH the efforts of the California Automobile Trade Association the garages and repairshops in that state have long been free from the stigma in the minds of many motorists that the concern rendering automotive service is the stronghold of a crew of pirates, to be visited only when dire necessity compels.

Ten years ago, a motorist taking his car into a garage to be repaired or adjusted, did so with the feeling that it would be a battle of wits to get the work done properly at a reasonable price. If he was overcharged, the only thing he could do was to grin and take his medicine. And as conditions had taken such an unfavorable turn, there was little hope of them ever being changed except by organized effort.

About eight years ago a man running a small tire repairshop in Oakland, Calif., saw this unfortunate state of affairs and started out to remedy it. In 1915 he got going on his plan to put the garage, service and repairman on a plane with the other older established business men and to bring the motorist to a realization of the important part they took in the general economic structure of the country.



Interior views of a California garage specializing in oiling and greasing. Cleanliness prevails here as well as in the salesroom. Incidentally, this is an excellent example of oiling and greasing rack construction. Blue prints of this rack can be obtained, without charge, from the Bassick Mfg. Co., 361 West Superior st., Chicago, by garages or service departments interested in giving lubrication service in this modern, time-saving manner

Today, after six years of work, this man has seen his plan grow into the California Automobile Trade Association, with more than 3000 members and 43 branches. Its insignia, the wheel and radiator, now stand for and guarantees honest work and a fair price wherever it is displayed by automotive firms.

The man is Robert W. Martland, now secretary of the association which he started as an association of tire men organized for the purpose of getting the list price, no more, no less, and to guarantee the car owner satisfaction and a square deal.

First—The protection of the automotive trade, including the conversion of bankers and other business men to the fact that the smallest garage or repairshop is a part of one of the largest industries in the world, and well worth the support of the entire community, not excepting the largest bank.

Second—The safeguarding of the public from fly-by-night garages, cut-rate firms, and cooperative buying organizations.

How well the first of these has been done can be shown by the fact that a garage or repairshop is rarely found which does not carry the insignia of the California Automobile Trade Association. The garage owners, repairmen and service men realize that not to have this insignia, not to display the standard sheet of the association and not to live up to fixed charges, with full work for full pay, means falling off of trade, then slipping away of old customers and, finally, no business at all.

The association wants the car owner to look for the insignia, and the car owner is doing it, with the result that the tradesman who hasn't the wheel and radiator on display is likely to be passed up for the man who has it.

To accomplish this result the organization employed newspaper advertising costing thousands of dollars, and billboards shouting in ten-foot type, "Motorists, Look for This Sign"—It Assures You Fair Treatment." The public was given tangible guarantee of a square deal if they would patronize members of the California Trade Association.

Overcharges, poor work, misrepresentation and any other grievance the car owner may have had against the service and garageman were investigated as soon as reported and remedied promptly, even though the application of the remedy required action in the courts.

A motorist who feels he has been "stung" has only to report the matter to the nearest branch of the association and a committee is appointed that same day to investigate the case. If the member of the association is right, he is upheld; if he is wrong, he is ordered to adjust the matter with the car owner. If he refuses to make the adjustment, his name is immediately removed from the rolls of the association, the insignia is taken from his establishment and the state office adjusts the claim at its own expense.

The result of this is that the motoring public has the strongest confidence in the members of the association, and this confidence has resulted in a continually growing trade for the men in the industry who live up to the standards set.

How the Association Gains the Favor of the Bankers and the Goodwill of the Community Business Men for Its Members

THE California Automobile Trade Association goes still further with the good work after having raised the business standards and won the confidence of the car owner. The next step to is educate the banker and the other business men in the community as to the soundness and responsibility of the men engaged in the automotive industry. A few years ago the garage owner, the service man and repairman were regarded as temporary additions to the local business life and not to be considered in the same class with the grocer, druggist or dry goods merchant in the matter of permanency.

In order to change all this attitude of the business and financial powers toward the automotive business, the association set out with a definite plan to win the good will and confidence of the bankers and business brethren. This was not to be accomplished by one great sweep of the state, but grew town by town, county by county, city by city, until the public, the bankers, the merchants and the men in the automotive industry were all united on a common and equally permanent business basis.

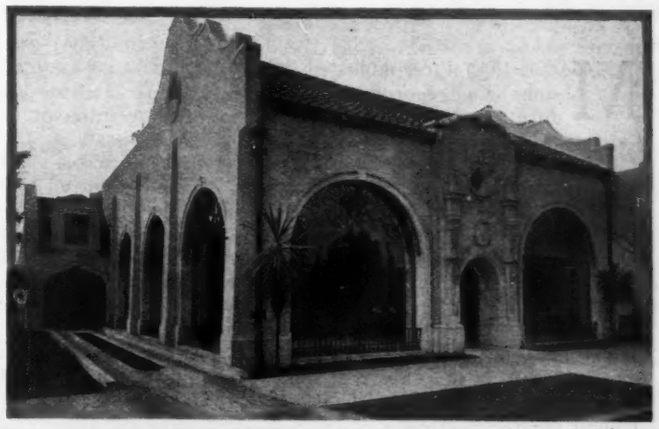
Automotive Business Men Have Greater Prestige.

To this end Martland started on tours of the state, making three a year. A few days prior to his arrival in any community, the officials of the nearest branch of the association sent out a letter to the leading financial and business men and to members of the local chamber of commerce, county, town or city officials and to members of the automotive industry operating there. Results of these letters and meetings have been wonderful. At the Santa Barbara meeting 200 attended; at Bakersfield more than 250 of the leading men of the community came out, and at Santa Ana, a city of about 10,000 people, nearly 300 attended.

Much closer relations between the dealers and bankers and business men in the community have been established, and the automotive men are looked upon as an integral and permanent part of these communities.

Speaking of methods used to interest the bankers and business men in the problems of the automotive industry, and to bring closer together the local financiers, merchants and professional men and the automobile dealers, garage owners, repair and service men, Mr. Martland said:

"My last trip took in 22 associations, at each of which a meeting was held. The plan of the California State Automobile Trade Association is to have the local association call the proposed meeting, under its own auspices, usually preceding the meeting with a banquet, to which are invited all the bankers and business men invited to the meeting. This promotes friendly feeling, enables the men to get together informally, and, as a rule, fosters discussions of matters foreign to business, bringing all the men together on a level of



The home of the Cunningham car in Los Angeles is beautiful and distinctive. It is of pure Spanish design. The showroom is planned as an open courtyard, the south and east sides being entirely of plate glass, while the other sides represent the exterior of Spanish houses adjoining

other matters, often those of the greatest community interest, ultimately showing that the man in the automotive industry is just as important a factor in the life and advancement of his community as is the banker.

"When I get there, the subject I take is 'Organization and Cooperation.' I particularly specify so that all can hear and understand that it is not my intention 'to jam our organization down their throats,' but I begin by referring to what our organization has accomplished, how it has done these things, and this virtually always sells the idea 100 per cent to all those present. They get this message: that what has been accomplished in the automotive industry can be done in the same measure, and accomplished in every line of endeavor, whether it be an association of peanut vendors or an organization of bankers.

Giving the Banker a Few Tips

"To the bankers, in particular, we extend an invitation to appoint a committee of three to meet periodically with a like committee from the local automobile trade association, to confer on matters relating to the automotive industry. We inform these bankers, and the other business men, that they may look to the committee from the local association for authentic information on any matters that may arise relative to the individuals in the association, or to any of the members of that committee.

"In the main, we have shown the bankers that it is not good business—for example—to finance a retired farmer, without any automotive experience, with an off-brand automobile; that the men in the automotive business, who have been doing business with them for years, are among their best accounts, and that the banker should not go into a business where he will have a lot of automobiles on his hands, only to have to go out and sell them, since this constitutes most unethical and business-destroying competition.

"In practically every community where we have a local automobile trade association, such a committee has been appointed, and is functioning. One prominent banker in the state told me that if this idea had been put into effect five years ago, the bankers would have saved many a dollar, and the automotive industry would have been looked upon in a different light than in the past.

Meetings Gladly Attended by Business Men

"It seems to me that, if such a plan were followed throughout the United States, representatives of the automotive industry would be sought and called in to the national conventions of the bankers' organizations to discuss the intimacies of the automotive industry with the bankers of the entire country.

"We are having no trouble now in getting representatives of the large banking institutions in California to attend our meetings, and to talk to and with our members on subjects that are very pertinent to the automotive industry, and also very instructive. The whole matter, in my experience, resolves itself down to this:

"The representatives of the automotive industry in every community must stop talking to themselves, and go out and talk to the other fellow, and then ACT.

"We have found that this method has worked out well here in California, and I am thoroughly convinced that the geographical location is not a factor in the success of the system adopted by the California Automobile Trade Association; but that the main factor in its success is the willingness on the part of the able men in our industry in this state to put the thing over."

Bakersfield Meeting of California Automobile Trade Assn. Furthers Work of Building Prestige of Automotive Industry Among Bankers and Community Business Men

MORE than three hundred delegates, the largest attendance ever recorded at a meeting of this kind in California, attended the annual general convention of the California Automobile Trade Association in Bakersfield, Dec. 5 and 6. Bankers from as far away as San Francisco, merchants from San Diego, Los Angeles, San Francisco and Oakland, and a number of men representative of the agricultural industry of the San Joaquin valley attended every session, as well as the members from the automotive industry—the first time, in fact, that representatives of these other industries and businesses have taken such an interest in the automotive industry as to attend these meetings.

The keynote sounded at the convention was "Service," which was stressed as the only real foundation for the goodwill and approval of the people, without which the automotive industry cannot exist.

Ray W. Sherman, merchandising director of the National Automotive Equipment Association, who is touring the country showing men in the automotive industry how to increase their business, was the principal speaker of the convention. He discussed "Asking 'Em to Buy," and exhibited a clever two-reel motion picture, illustrating the manner in which one garageman increased his profits by "asking 'em to buy." Sherman repeated his message to San Francisco dealers and jobbers the following day. In the course of Sherman's remarks, he said:

"The possibilities of the accessory jobber in California are limited only by his own industry, ability and willingness to give service, and thereby win the goodwill and the approval of the people, without which he cannot long succeed. There are today 500,000 automobiles in California alone, and this half million cars call for an annual average of $25,000,000 in accessory and equipment sales.

"To make these sales, little more is needed than to 'Ask 'Em to Buy.' The Automotive Equipment Association is issuing a book called 'Greater Business,' and it is available to all dealers who care to make use of it. Copies may be obtained from jobber members of the A. E. A., or any of their salesmen."

M. E. Drum, character analyst, followed Sherman, with a talk on the methods of judging and handling prospects in automobile sales.

The most important business accomplished by the convention, aside from the bringing together of the financial, commercial and agriculture industries on a common foundation of interest with the automotive industry, was the establishment of regular dates for three annual meetings, that of the Northern Division in February, the Southern Division in June, and the general meeting of the California Automobile Trade Association, for the election of officers, in October.

Santa Barbara was accepted as the scene of the next general convention in October, 1922.

After this clearing away of the business of the convention, J. F. Thompson, general manager for Southern California of the Willys-Overland, spoke on the necessity of cooperation between all departments of the automotive industry—his subject, in line with this of the convention—being "Service With a Smile." Thompson told the story of the boy who was so badly injured in a train wreck that, on his demonstrating to the jury that he could no longer smile, he was given $20,000 in damages. "If," said the speaker, "a boy's smile is worth $20,000, how much is your smile worth in business?"

J. O. Davis, who for eight years was collector of the port of San Francisco, discussed "Federal Tax Reductions," making the point that Federal taxes cannot be reduced until the bureau system at Washington has been eliminated. He made plain the application of the Federal tax system to the automotive industry and the many handicaps imposed by the costly and inefficient bureau system in the operation of government at the national capital.

Prospective legislation, to be presented at the next session of the California Legislature, was outlined and discussed by

Ivan Kelso, assistant general counsel of the Automobile Club of Southern California, who assured the convention of the support and cooperation of his organization. H. J. Banta spoke on "the priceless ingredient," which he declared is the goodwill and approval of the public. Bob Martland supported Banta's address by saying that the reason for poor business done by some firms is the lack of the one thing that costs the least—courtesy.

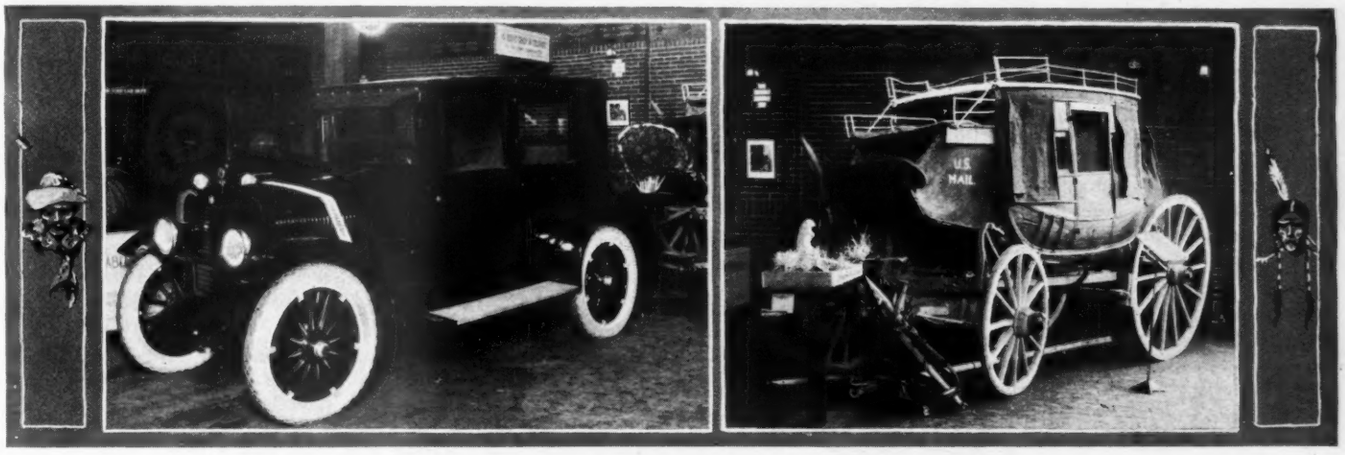
Further talks and discussion along the line of service, courtesy and winning public approval accomplished good results. In fact, this meeting set a far higher value on these ingredients of success than on the actual technical or mechanical factors of the automotive industry. **The Golden Rule had more adherents there than the usual Sunday school convention, and practical service, combined with courteous words, was urged upon all the delegates by every speaker.**

Carl J. Rosenberg, sales auditor, was the first speaker, discussing sales methods and records. H. A. Nator, assistant to the vice-president of the Bank of Italy in San Francisco, represented the financial interests, and expressed their close connection with the automotive industry in a manner seldom admitted by the bankers.

He declared that the automotive industry is now of such size and importance that it is well worth the time of any banker, no matter how busy he is or how large his interests, to attend meetings of representative men in the automotive industry and listen to their discussions, as well as to discuss with them the banker's attitude to and relationship with that industry.

Daniel S. Jones was the last speaker, discussing the undeveloped resources of the country, and the real need of disarmament.

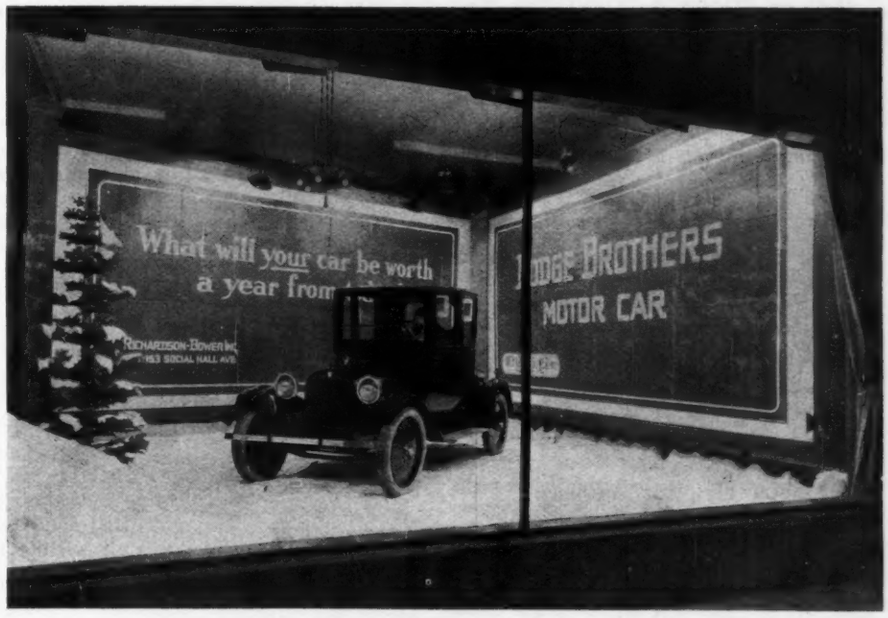
Contrasting the Old and New in Transportation



IT'S a long step from the stage coach of early western days to the new Essex coach of today, so to emphasize the progress and to draw attention to this enclosed car, Tom Botterill, Denver distributor, arranged an unusual display contrasting the new and old modes of transportation.

Alongside this newest coach in the Botterill salesroom stands the oldest coach in Colorado, a stage coach that ran between Denver and Georgetown in 1865. A realistic touch is provided by a piece of prairie cleverly mounted, containing some cactus, some buffalo grass, a prairie dog mound and a prairie dog. Nearby is also a brief historic sketch regarding this quaint specimen of transportation equipment. Here the visitor finds the following facts: this coach ran between Fairplay and Leadville, crossing the Continental Divide by way of Mosquito Pass, at an altitude of more than 11,000 feet. It was pulled by six horses. The coach was driven by Mr. Morrison, its present owner, who estimates that it has carried more than five million dollars' worth of gold bullion out of the rich Leadville mining district. It was the object of many stage coach robberies, and on one occasion its right front wheel was completely shot away, the messenger in charge of the United States mail being killed.

Visitors are informed also that the first stage coach came to Denver, May 7, 1859, with one passenger, Henry Villard, who paid $200 fare from the Missouri river and had been 19 days on the road. This Essex coach, it is pointed out, will go from Denver to the Missouri river in less than 19 hours, and on less than nine dollars' worth of gasoline.



An Effective Enclosed Car Week Display

Enclosed Car Week in Salt Lake City resulted in many interesting and attractive displays. The feature of the display of Richardson, Bower, Inc., was its reality and simplicity. This, in addition to associating it with the Dodge Brothers current advertising, made it very effective. In the car was seated the wax figure of a beautiful woman, richly gowned and independent of inclement weather, tending to convince the onlooker of the comfort of the enclosed car.

"BUY THEM RIGHT"

A Fundamental in the Used Car Situation

By ALFRED REEVES
General Manager of the National Automobile Chamber of Commerce

AFTER a careful investigation of the used car situation and with high regard for many of the suggested plans to cure the evil, the most important thing in connection with any used car plan is to buy them right.

From all quarters come suggestions for curing the used car evil, which has fallen on us more heavily this year than ever before; but while many of the plans have merit, the real fundamental is to take in the used car at the right price—which means a price that will enable it to be sold at profit.

We hear of second-hand car losses, but the fact is these losses resulted from cutting prices on new cars, the cut not being made from the list by allowing too much on cars taken in trade. Dealers have said they cannot do business unless they allow high prices for old cars. The question is whether the dealer is going to allow the customer to run his business.

The used car has been with us ever since the beginning of the industry and probably always will be with us. Its menacing advance has gone on almost unnoticed while demand exceeded supply, but during the past year of readjustment it developed into a giant that threatens the industry more than any other one thing.

It is an extraordinary situation when we have an annual turnover, at retail, of probably $300,000,000 worth of used cars which were bought at such high prices that the final transaction shows little or no profit. Surely something is radically wrong.

Everyone has been at fault to some degree, and the whole situation has been made worse by the present readjustment period.

Overproduction Partially to Blame

Some manufacturers have overproduced. They had many reasons for so doing. Some wanted to clean up their high-priced inventory quickly in order to get their cars on a lower price basis. Others were forced by their bankers to liquidate rapidly; some makers with a large number of dealers knew that these dealers had to have a substantial number of cars to maintain their establishments. The manufacturer must assume his part of the blame, and he is quite ready to help to better the situation.

Need Better Used Car Salesmen

Most dealers have been weak in the handling of their second-hand cars. This was true during the past year, just as much as it is today. Many of them did not know second-hand values, or, if they did know such values, knowingly allowed more and then held the car many months hoping to get the inflated price; **salesmen of the dealers have worked harder to buy the customers' second-hand cars than they have to sell the employers' new cars; too few good salesmen have been employed to sell second-hand cars;** even where there have been official appraisers in the town, used car market reports and other guides, the dealers have been disinclined to hold to what were proper trade values. Even in the local situations there has been the poorest kind of cooperation.

There is blame enough for all, but now our interest lies not so much in going over past history as in finding out proper remedies for present conditions.

By the instruction of the last N. A. C. C. meeting our staff has been making an investigation of the used car situation, which we hope to complete within the next few weeks, when a report and possibly some recommendations will be made.

Of the plans offered, some infringe the restraint of trade laws, others require too much money to put into operation, and still others would be too long in bringing the needed improved condition.

We think it will be found that manufacturers will plan production based on the requirements of their dealers. Manufacturers always learn of their dealers' needs before they plan production, and it is only because of general fundamental conditions going wrong that this year's production of 1,700,000 cars and trucks has not been easily assimilated, bringing the large number of undigested second-hand cars.

May Advertise Prices of Old Models

Out of all the ideas offered, the dealers seem to most favor two definite plans, the first to be acted upon by the manufacturers and the other to be supported by the dealers.

First—Each manufacturer, in advertising his new cars, to also advertise the market price of his older models.

Second—Dealers in each locality to authorize one or more public appraisers, similar to real estate appraisers, who, for a fee, paid by the dealer, will give the sales value of an year submitted by a dealer or customer.

Local Impartial Appraisers

Under the first plan the manufacturer will advertise the sale price of his older models in good condition, based upon reports from around the country. It should not be necessary to give values of cars less than 18 months or more than four years old.

The plan would give some protection to the new car dealer, because a customer could hardly ask for a greater allowance that he knew could be obtained for his used car. Any dealer exceeding this allowance would do it with the knowledge that he is inviting a loss which he is apt to take by promptly selling the car at the known sales value.

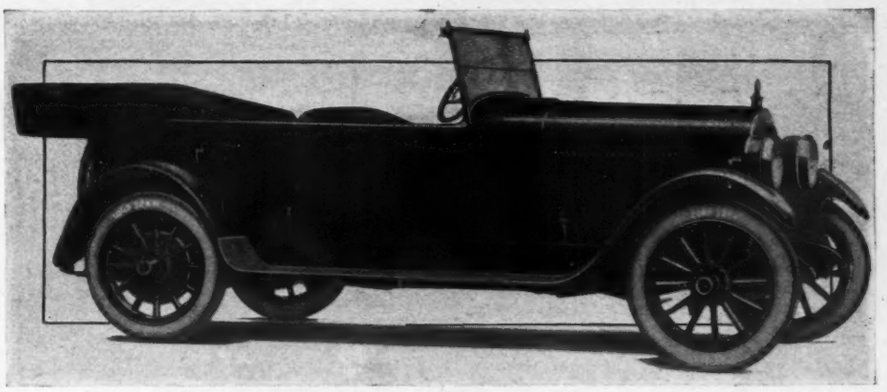
Under the second plan, the dealers in each locality would appoint a certain number of appraisers to appraise second-hand cars offered in trade. These men at proper quarters, with experts, would judge the condition of the car and issue a certificate to the owner giving a value that would be recognized by all dealers.

The dealers would pay a fee of $2 or more to the appraiser and would be entirely independent of any particular dealer. He would be appointed for his ability, just as certain real

estate appraisers are recognized by real estate firms.

Such a plan would give dealers a true knowledge of the value of the car. Of course, nothing could prevent any dealer from allowing a sum in excess of the appraised valuation, but, in so doing, he would be incurring a loss with his eyes open. Customers, as a rule, expect the dealer to make a fair profit. Owners of used cars, unfortunately, overestimate their value, and where there is no official appraisement in opposition they are generally good enough salesmen to sell the dealer a car for more than its worth.

No matter what plan may be firmly approved by manufacturers and dealers, the fact remains that the used car problem will continue to be a menace until the dealers learn enough about values to buy second-hand cars, for a profit, and not at prices which they know are certain to involve a loss. Perhaps there is no better slogan to help the used car problem than for every one concerned to "buy them right."



New Lexington Thorobred

THE frame of the Lexington Thorobred has been lightened in weight and has been given additional strength by making the side rails straight and forming them into one solid unit. The running-boards are flanged on the inner and outer ends for rigidity and are part of the frame. The Ansted engine is used in this model. The engine is of the overhead valve type, employing the valve-lift principle. The new Thorobred differs slightly from the former model in its body dimensions and the sides are higher. Lexington Motor Co., Connersville, Ind.

New A-C Speedometer Has Number of Radical Changes and Improvements

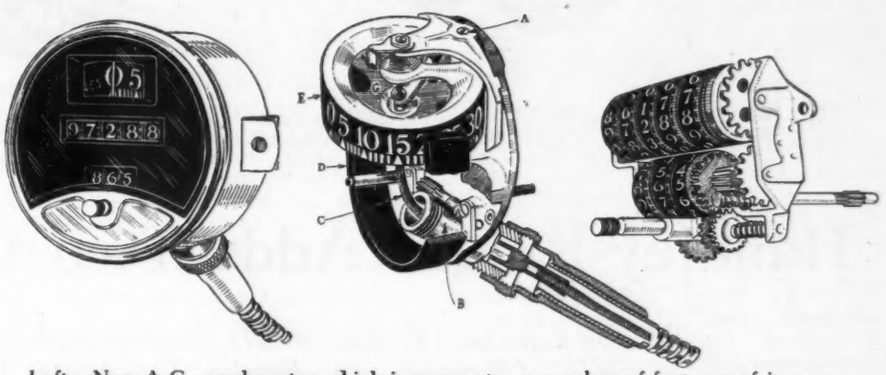
THE new A-C speedometer is a completely revised edition of the speedometer which the Champion Ignition Co., Flint, Mich., announced in 1919. While operating on identically the same principle as the previous instrument, the new speedometer incorporates a number of radical changes and improvements, tending to simplify the manufacture of the speedometer as well as to make it more certain in operation.

This speedometer operates entirely on the magnetic principle, having a stationary, permanent horseshoe magnet mounted in the interior of the instrument. An armature rotates within the magnet, being driven by the flexible shaft which is connected to the driving mechanism of the car. The armature revolves in the magnetic field between the poles of the horseshoe magnet. Between the armature and the stationary magnet is a non-magnetic element in the form of an aluminum cap having on its periphery a scale which indicates the velocity of the vehicle.

This lightweight cup is sensitive to the magnetic drag caused by the rotating armature throwing the magnetic lines of force in the direction of rotation. Owing to the light weight of the non-magnetic aluminum cup, the dial is very sensitive to the magnetic drag, allowing the instrument to start to register at a speed of one mile per hour.

This is the identical principle employed in the previous instrument. Changes, however, include a non-adjustable magnet, which is positively fixed in position. The speed element is now adjusted into and out of the magnetic field by an adjusting screw for calibration. This adjusting screw is shown at A in the illustration.

In place of the laminated armature formerly employed, the rotor is now a single piece of electric iron stamped to shape. This adjusting screw is set at the factory and then sealed and covered so that it cannot be tampered with after the final adjustment. In the former instrument, an automatic thermostat control was used for changing the relations of the armature laminations one to the other. In the present type of the instrument, which has the solid single rotating unit, the thermostat control has been eliminated and compensation for temperature rendered unnecessary by the heat treatment of the magnetic elements.



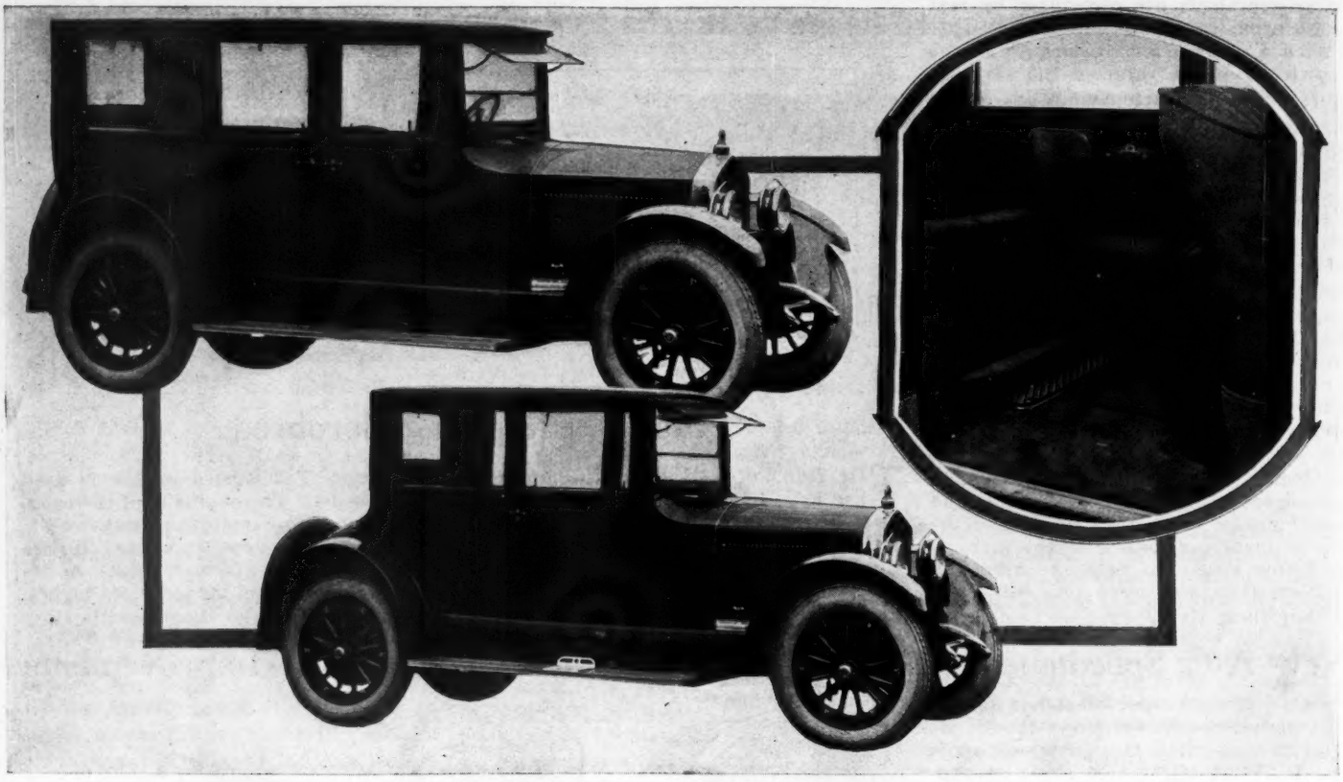
Left—New A-C speedometer which incorporates a number of features of improvement. Middle—Important elements in new A-C magnetic speedometer; A, adjusting screw; B, odometer driving worm; C, flexible shaft driving rotor of magnetic iron; D, magnets; E, non-magnetic cup carrying dials; F, odometer wheel and driveshaft; G, rotor of magnetic iron. Right—Odometer unit in new A-C speedometer showing mounting of dial wheels and driving members

Flexible Shafting

An important improvement in the instrument is the automatic lubrication of the high speed bearings. These bearings operate within glands which contain oil of a special composition that will not be thrown out of the bearing. This is a factor in increasing the life of the speedometer and tends to eliminate the noise which is often found after several thousand miles of travel. The flexible shafting is of the so-called dental wire which was developed during the war by the Bureau of Standards.

It consists of four laminations of piano wire wound spirally in opposite directions and, while permitting a drive through a very sharp angle, is still practically free from torsonial distortions under the stresses imposed by driving the unit. The odometer is driven off the worm, B, while the rotor for the speedometer part of the instrument is driven by a short piece of the flexible shafting, C, which performs the function of the universal joint.

All of the parts used in the instrument are rugged. The neck, to receive the shaft, has a ⅞-18 S. A. E. spark plug thread. This gives a very substantial connection of the flexible shafting to the instrument. Only one size screw is used throughout and connection to the car dash is quick and simple by means of wing nuts which screw into a U-shaped bracket. The flexible shaft in this instrument runs at 168 r.p.m. at 10 m.p.h. In other words, this flexible shafting makes 1,008 revolutions for every mile of travel. A geared up reset is used, which gives a very quick acting adjustment on the trip reading of the instrument.



Top—New series Handley-Knight seven-passenger sedan which is mounted on refined chassis. Below—Handley-Knight type sedan-coupe which is a two-door body with tilting Pullman type front seat. Right—Rear seat of Handley-Knight new series seven-passenger sedan. Heater is furnished as standard equipment

Handley-Knight Adds Two Closed Bodies

Minor Chassis Refinements Incorporated in the Latest Models—Changes in Brake Controls Give Greater Leverage

FOR 1922, the Handley-Knight chassis has been revised and refined and two closed bodies, sedan and coupe, added to the line. The touring body remains the same, but the new chassis is used for this, as well as for the two new closed bodies, these three body types comprising the line.

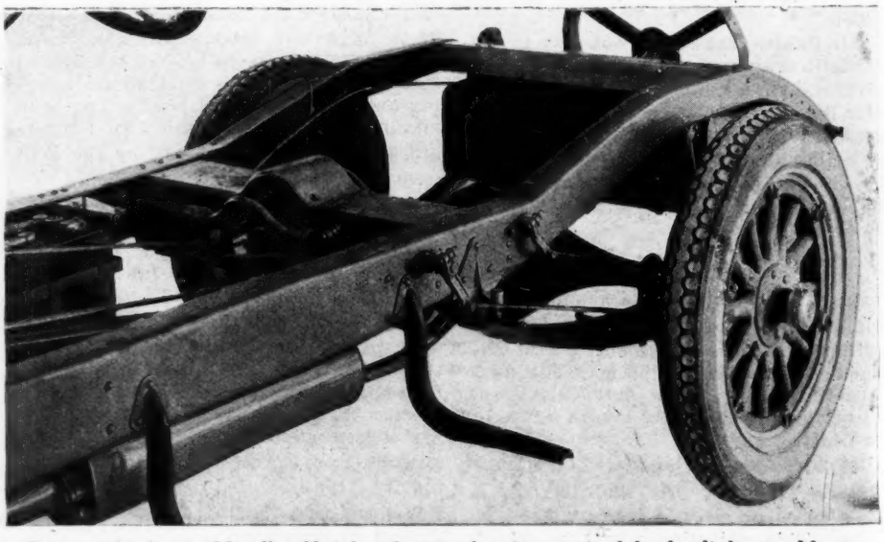
The changes in the chassis are largely concerned with giving greater durability through a stiffer and more substantial structure and increasing the convenience of the driver by making the control pieces lighter and, consequently, more readily handled. Some of the changes also have to do with appearance.

Braking Controls Changed

The changes in the control system include a rearrangement of the braking mechanism so as to give a greater leverage and, consequently, a lighter pedal action. The gearshift lever is also more conveniently located and operated. Another change on the control is an improvement and rearrangement of the brake equalizing mechanism to give more complete equalization.

The entire propeller shaft assembly has been redesigned and a heavier propeller shaft employed, and in place of the fabric universals, Spicer joints are now employed. The Handley-Knight engine has not been altered in any detail except the ignition, which is now the Auto-Lite system.

The structural changes include a stronger tire carrier and a stronger battery box, the latter being supported by two heavy brackets. For greater durability, the wiring system has been com-



Rear end of new Handley-Knight chassis showing revised brake linkage. Movement of the springs does not affect the position of the brake operating levers

pletely enclosed in conduits and the wiring has been rearranged and simplified.

The changes which have been made for better appearance include wider, deeper and heavier fenders, and thicker runningboards, which ar now covered with aluminum instead of linoleum. There is now an aluminum cast trim rail running along the sill at the hood line from the end of the cowl to the radiator. The chassis is now lubricated by the Empress oiling system, which employs a high pressure oil gun from which the oil is released when the gun is connected with the chassis lubricating points.

Sedan-Coupe Body

The two new closed bodies are the sedan-coupe, which seats four or possibly five, and the sedan, which seats seven. The sedan-coupe justifies its name in its appearance, as it is longer than a coupe body and shorter than a sedan. The seating arrangement is, of course, controlled by the two-door body. There are individual chairs at the front with the seat beside the driver tilting forward, leaving a passage-way to the rear. The rear seat is continuous and provides room for two passengers readily and three in an emergency.

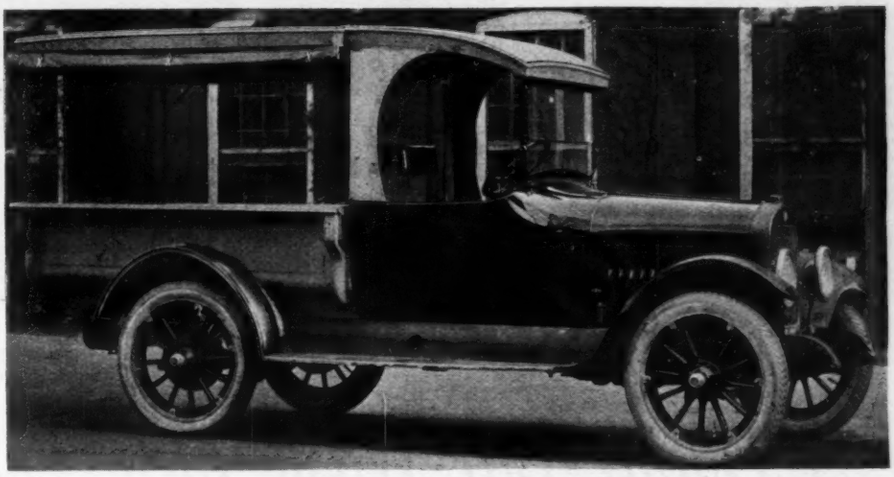
Large Luggage Space

The seating in the sedan is the regular seven-passenger layout with two continuous seats in the front and rear compartments and extra folding seats for two passengers. The seats in both models are tilted at an angle and are all supported by extra heavy cushion springs deeply padded.

One of the features of the sedan-coupe is the large luggage space available. This is reached by lifting the back of the rear seat disclosing the entrance to the compartment under the rear deck. With this arrangement, the baggage can only be reached from inside the body, which fact assures protection for the baggage when the doors of the body are locked.

The fundamental specifications of the car have not been altered. The engine is a Handley-Knight sleeve valve type with 4⅛-in. bore and 4½-in. stroke. This engine is cooled by Thermo-Syphon equipped with Auto-Lite starting, lighting and ignition; Timken axles with Hotchkiss drive; Gemmer steering gear, and is mounted on a 125-in. wheelbase.

Dort Adds Delivery Car to Line



A NEW model has been added to the Dort line in the form of a light delivery car. This car complete with driver's cab, steel body, canopy top with side curtains, will be priced at $825 f.o.b. factory. Three additional models of the chassis are planned.

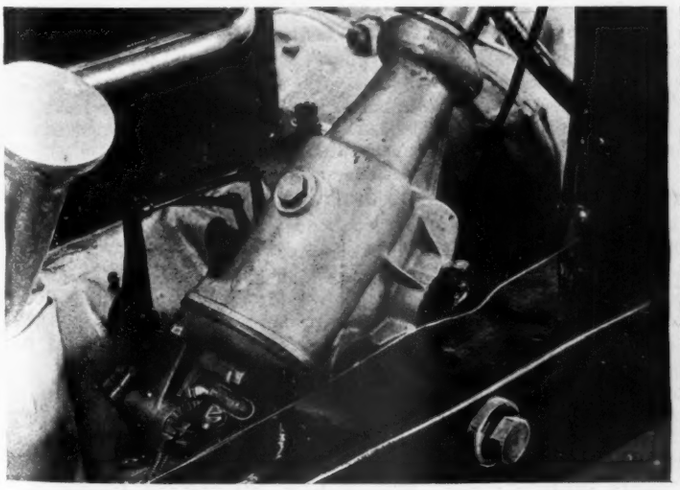
The chassis with lamps, lamp brackets, front fenders, runningboards, radiator, hood, windshield, seat frame, cowl board and instruments and body to rear of front seat will be sold at $685 f.o.b. factory; and with driver's cab and double texture duck curtains front and rear will be priced at $715. With an all-steel express body and no top, the delivery car will be priced at $780.

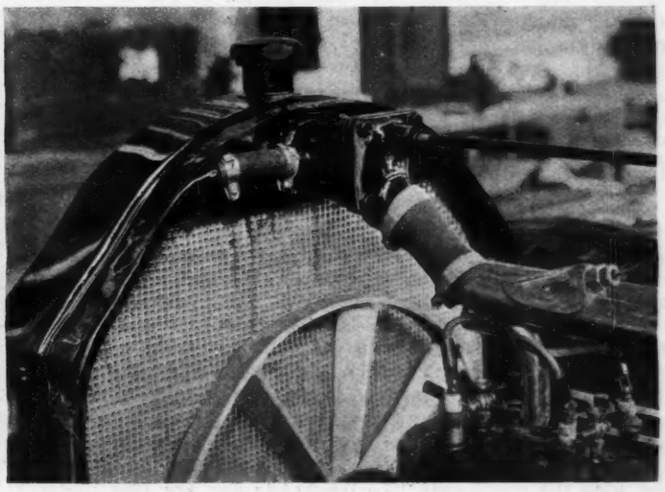
The car has been designed to meet the needs of merchants who operate an extensive delivery radius. This, of course, includes local merchants of all sorts and it is particularly adaptable to farmers, truck gardners and pick-up and delivery service.

The chassis specifications are identical with the standard Dort chassis including the four-cylinder block 3½ by 5 in. engine; leather faced cone clutch; three-speed, selective transmission; three-quarter floating rear axle with semi-elliptic front springs and cantilever rear springs.

The wheelbase is 105½ in. The equipment includes electric lights, American-Bosch starting motor and generator, U. S. L. 6-49 battery, horn, speedometer, ammeter, lighting and ignition switch, demountable rims, extra rim, license plate holder, tire carrier and complete tool equipment.

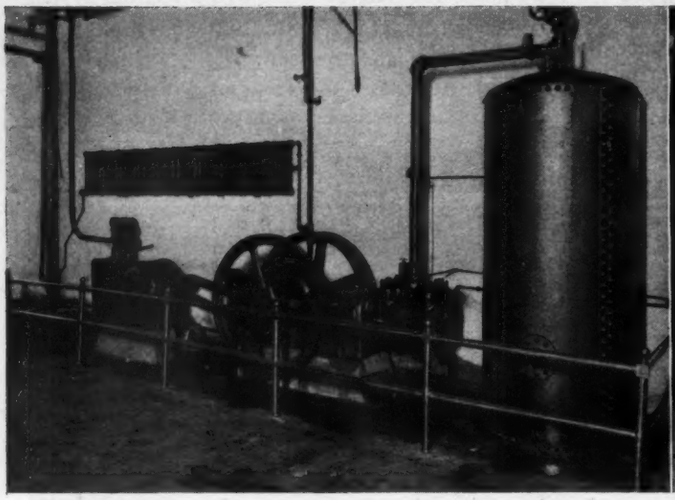
Points of Design on the Stevens-Duryea Which Will Interest the Service Man





ONE of the features in the design of the Stevens-Duryea is the manner in which the steering column has been mounted on the main frame member. As will be noted from the illustration, a single but substantial bolt is used for attaching the column. This permits of ready removal of the column and also makes it possible for the steering gear to be placed at an angle to suit the type of body employed. Note also the large and accessible oil filler on the extreme left of the picture.

The other illustration shows a close-up of the thermostat. It will be noted that the cap on the thermostat has been cast with a boss, which, when drilled and threaded, furnishes a support for the radiator stay rod. This simplifies construction and facilitates service.



The air compressor plays an important part in making it possible to wash cars for one dollar. The compressor in the Hatcher Service Co. wash rack supplies several nozzles at once. At the right is shown the space used for washing. There are three drain pits and room for two cars at each pit

A Dollar Car-Wash Idea That Is Paying a Dividend

SYSTEM and Proper Equipment Have Made Is Possible to Clean a Car at a Profit for This Small Amount—But That Is Not the Main Business-Getting Idea You Will Find in This Article

THE service station wash-rack, generally regarded as a "white elephant" on the hands of the owner of the establishment, or at least an evil which goes along with the business, can be made to pay for its keep.

Henry Meyer, manager of the Hatcher Service Co., of Springfield, Ill., stumbled onto the secret, almost by accident. The retail merchants of Springfield were making preparations for a "Dollar Day" celebration—a certain day set apart twice each year for the giving of unusual bargains for one dollar. The service man was progressive and wanted to get in with the crowd, but his difficulty arose from the fact that he had nothing in particular to offer—that is, nothing which would stand out as a remarkable buy. He considered his line of accessories, and then finally hit upon the idea of washing all cars brought in that day for one dollar, regardless of size, make or condition.

Idea Makes a Hit

No extensive advertising was used, merely single line reading notices, and a one-inch space at the bottom of the regular ads used by the Hatcher company, the sales organization of the concern. But on this bargain day every merchant whose name was listed was supposed to give something unusual, and the small ads did the business. The idea took hold and the wash-rack was swamped with cars all day. People from the country and nearby towns who came in to take advantage of the bargains offered in the stores, left their cars to be washed, and called for them in the late afternoon. They had thus saved storage charges and their cars were clean and bright.

During the day this service man had been doing some thinking, with the result that "We Wash Any Car For One Dollar," became a permanent slogan of the establishment. A rubber stamp was made with the wording:

We Wash Any Car
for
One Dollar

This stamp was used on every piece of mail which left the office, and it has paid for itself many times. When a car is properly washed there is no profit to speak of at a dollar per car, but the service manager was thinking far in advance. Good equipment has always been this man's hobby and his wash-rack outfit consists of something more than a hose and a sponge.

Air and Water for Washing

The space allotted to washing cars consists of three drainage pits of cement, each pit having space for two cars. The washing is done with an air and water mixture, the ratio being about seventy-five per cent of air to twenty-five of water. Air comes from a compressor and is piped to each rack and connected by a hose to a Y shaped nozzle, the water hose connecting on the opposite opening. The proper mixture of air and water is then regulated by cocks and escapes through the single nozzle opening. This nozzle is made of half-inch standard pipe and choked down to about three-eighths at the outlet. By using the cocks it is easy to shut off either the air or water on occasion.

With this attachment, car washing troubles are over. The spray of water coming through the nozzle at high pressure loosens the mud or dirt and the air blows it away. It is especially good for use under the car and with wire wheels. To finish the job, the water is turned off and the air is used to clean the motor, to blow the dust from the carpets and upholstery, and to dry the water from the under parts of the car and in the radiator openings. The car is then turned over to another man who finishes the body with a chamois.

In this store the washer works on a piece-work basis of thirty cents per car. The chamois wielder can handle the output of two men with the hose. Fifteen cars per day is a moderate average for each washer.

The air comes from a Sullivan Type WG-6 compressor, the pump having a 10-in. cylinder with a 10-in. stroke. It is belt driven from a 40-hp. motor, and will deliver 220 cu. ft. per minute at 120 lb. When several nozzles are working, the

average pressure is about 60 lb. The compressor has an unloader set for 120 lb.

Other Business Results

The dollar wash made a decided hit with the customers, and the service manager made it a point to see as many of them, personally, as he could. The result was that the simple washing job turned into regular repair jobs, in the sale of oil and grease, repairing of curtains and doors and complete motor and car overhauling jobs, from customers who had never been in his place up to that time. If oak trees spring from acorns, then the humble wash is growing into a sturdy oak of business, with branches reaching into all departments.

Will Form Car Washing Club

Another idea is the outgrowth of the dollar wash. A car washing club is being formed, whereby each member leaves his car once a week. With a club of fifty or seventy-five members, this wash-rack is going to run along smoothly this winter, and the pick-up jobs going into the shop as a result of the good will established, will keep quite a force of mechanics busy during a season which has generally been regarded as dull.

What the Owner Didn't Know

A novel feature in connection with the one dollar car washing is the fact that all cars, regardless of size, cost the same. One man drove in a Ford roadster to be washed and, when told that his bill was one dollar, and the same for any sized car, he returned the following day with a Pierce-Arrow limousine. Had he but known it, the big car was washed in less time than the small one, on account of the simplicity of its lines and the superior body finish.

In cases where a car has picked up tar and road oil on the wheels and under-side of fenders, it is removed by a coal-oil and air mixture from a portable tank, connected with the air line.

Extra charges are made for polishing, thorough cleaning of oil and dirt from the motor and simonizing. These extras are in the nature of "velvet" and are directly traceable to the attraction of a car wash for a dollar.

What You Want to Know About Oil

THERE is one assertion that usually puzzles and annoys the automotive dealer more than any other, viz.: the talk about the scarcity of gasoline in the near future.

As a rule the dealer does not know how to answer this assertion, because the gasoline belongs to another line of industry and one in which a special education is just as necessary as it is in the automotive industry. One can hardly expect the man who has a day's work to do six days of the week and usually on the seventh, too, to know the intimate facts of two of the greatest industries in this country. So the dealer observes that he does not believe that the supply of gasoline is going to give out, and lets it go at that.

Often this dealer is himself puzzled by what he reads concerning the gasoline supply. It is small wonder, for there has been little written that will give the average business man an idea of what the gasoline scare is all about.

It appears that a book published by the Century Co., under the title, **"America's Power Resources,"** by Dr. Joseph E. Pogue and Chester C. Gilbert, is designed to give to its readers just this explanation. This is not a highly scientific volume, although the reading of it will leave the impression that the authors are thorough students of the oil business. But this volume does make it very plain that while there is every prospect that gasoline, as we now know it, will be produced in a constantly reducing volume, there need be no fear of a scarcity of motor fuel.

The one great thing that is needed, according to the authors of this volume, is a better appreciation of our carbon fuels and a better use of them. There are many units of gasoline—or its equivalent—hidden in coal and other fuels, and these must be conserved if the internal combustion engine is to continue to extend its economic and social field. The authors of this work leave the impression that there is no doubt but that this will be done. Not only is the supply of gasoline to be the reward, but the same process will give to us cleaner and better cities, less traffic by the elimination of the crude coal as a traffic item and a much greater economy, actual and technically, in the use of our natural resources.

Of course, we all have had the faith in the ability of our engineers and inventors that they would not see motor transportation wane because of a lack of a source of energy, but here we learn that a blind faith is not necessary, as the path for this work is entirely blazed and the development of the future is rather an economic one than of scientific pioneering.

There is a paragraph in this book which reads:

> "It is not beyond the bounds of reason to foresee a condition whereby a householder, in place of his ton of anthracite which he now welcomes at $11, will receive a ton of smokeless fuel, a month's supply of cooking gas, 40 miles of motor fuel, enough fertilizer to start a small garden, and tar sufficient to allay the dust in front of his house—all for far less money than he now pays for anthracite coal. This may appear a fanciful picture, but coal has precisely this possibility within itself."

Following closely upon this volume is another, which is rather a natural sequence. This is **"The Economics of Petroleum,"** by Dr. Pogue, who is co-author of the volume just written about. This book, published by John Wiley, might be considered as the next grade in the study of the petroleum situation.

The contents of this book are well described by the chapter headings, which are as follows:

I The Economic Organization of the Petroleum Industry.
II The Resource Situation.
III The Trend of the Oilfield Development.
IV The Trend of Oil Production.
V The Transportation of Crude Petroleum.
VI Trend of Refinery Practice.
VII Analysis of Refinery Capacity.
VIII The Outlook for Oil Refining.
IX Gasoline.
X Kerosene.
XI Fuel Oil.
XII Lubricating Oils.
XIII Petroleum By-products.
XIV Natural Gas and Natural Gas Gasoline.
XV Marketing of Petroleum Products.
XVI Analysis of the Exports of Petroleum Products.
XVII Prices of Petroleum and Its Products.
XVIII Relation Between Price and Production of Crude Petroleum.
XIX The Bearing of Automotive Transportation Upon the Oil Industry.
XX The Economic Significance of Cracking.
XXI Composite Motor Fuels.
XXII The Motor Fuel Problem.
XXIII The City Gas Problem.
XXIV International Aspects of Petroleum.
XXV Mexico as a Source of Petroleum.
XXVI The Relation of the Coal Industry to the Oil Industry.
XXVII Oil Shale.
XXVIII Full Utilization of Petroleum.
XXIX The Function of Statistics in the Petroleum Industry.

While this volume is spoken of here as an advanced study as compared with the volume first reviewed, it is sufficiently non-technical that any business man can read and understand it. It is not a volume solely for oil men educated in oil affairs and technique.

London Show Indicates a Trend Toward Small Cars

Low Horsepowers Especially Notable—Some Four-Cylinder, Water-Cooled Engines Developing 5 to 8 Hp. Seem Small Enough to Carry by Hand—Some Dealers of Opinion That Body Prices Are Too High

LONDON'S fifteenth annual automobile show, which opened November 5, showed a marked spirit of optimism in the dealers' readiness to discuss contracts. Cars under 150 cu. in. piston displacement were especially a topic of interest.

There were far more cars of small type this year. Whether there is room for all of them even in the admittedly considerable market which does exist for the type covered, is a matter of serious doubt. That many of them could very well be weeded out and dispensed with, to the general benefit of the bulk, is not in the least doubtful. At any rate, there are many which could be eliminated, even if only considered from the point of view of design, pure and simple. Eliminating the unfit and those which are not likely to be manufactured in serious earnest, we get down to a nucleus around which a good healthy trade could be built up.

Interest so far as this particular article is concerned, is in cars with a maximum of 10 hp., according to catalog. Even so, however, the number of different models with which this article must deal is so considerable and their variety so great that it is somewhat difficult to set any dividing line which will not be open to criticism on the score that there is ample room for doubt as to the side of the line on which a good many of the machines ought to be placed. The obvious method of classifying these machines is to separate them into those which can be described as cyclecars, pure and simple, and those which are really entitled to be called motor cars.

Low Horsepower Startling

A really astonishing feature is the extremely low figure which we are now approaching for the limit of nominal horsepower for a four-wheel car, presumably able regularly to convey two passengers, which is equivalent of suggesting that from time to time four will undoubtedly be the load. Horsepowers which were customary in 1896 are now coming into fashion again. Five, six, seven and eight, are quite popular among the small car manufacturers today, and apropos of 1896, what a host of memories is conjured up by the little Wolseley with its two-cylinder horizontal opposed engine!

Equally notable is the number of engines of from five to eight horsepower which embody four cylinders, water cooling and all the features which are customary on machines of five times the capacity. Some of these engines would almost seem to be small enough to be held in the hollow of the hand.

The Trend of Body Design

First, as regards the ordinary open touring models in both two seater and four and five-seater styles: Dickey seats for one or two passengers are becoming general standard provisions where price admits on the two seater models. There is a tendency to provide and make easy use of side curtains to all models, to make cars as weatherproof as possible and to give comfort. Some of the hoods on two-seater models, seem almost too low presumably to make the hood fitments not too bulky when folded back. Dickey seat passengers are so far unprovided for against adverse weather conditions.

All bodies more or less are being designed to provide more leg room for both driver and passengers, and comfort is being studied as never before. More particularly is this the case on the four and five-seater models.

Outwardly, general lines are excellent. The fitting and merging of the bonnet lines from radiator front rearwards into what may be described as the combined cowl and body work proper, has received great attention at the hands of designers. These merging lines and curves are of a very divergent character, but most are neat, providing there is a sufficiently high-fronted radiator and length of bonnet. In the case of short bonnets, curves into body works appear too abrupt and spreading into outer bulk to give neatness and gracefulness. The best and handsomest in appearance are those where sharp cornering lines are carried along the bonnet and fit corresponding sharp lines of body work cowl.

Windscreens Popular

Though windscreens for rear passengers are becoming increasingly popular, being, indeed, considered just as necessary as are front screens for the driver and front passengers, they are fitted on but few cars as standard, and there is a notable lack of provision for these desirable adjuncts in rear parts of the cars, which should be remedied. On the cheapest open touring cars, perhaps, it would be too much to expect these provisions, but they should form part of the design on all medium priced and expensive models, for assuredly in the near future the rear wind-screen will be considered as much a necessary standard fitment as are front screens today.

One man hoods are now common on all cars of medium size, and the necessary expanding metal frame work for these shows much development during the past year.

Are Bodies Too Dear?

In the opinion of some dealers body-work of cars is much too dear. They say that the prices of cars have been reduced and now we require cheaper body-work. In some cases there is a huge difference between chassis price and "complete with body" price, which the style of body-work scarcely warrants. They are left wondering in these days of falling prices for timber and other materials and the increasing use and substitution of Pegamoid, Rexine, and other similar imitations for real leather, why body prices should still be so high.

A dealer is quite unable to judge the cost of closed carriage bodies of the salon and limousine order with their ornate finish, but is better able to judge the open cars in this connection, whether of a two-seater or four-seater style, and especially when he sees them in the making. Most small car makers are considered to aim at too great a finish as regards painting and varnishing, and it is asked whether such high finish is required ,and whether costs could not be reduced in this direction.

On the other hand, some makers have a small margin of price between chassis and complete form. Indeed, in some cases the price of body work difference seems too low, and either such are supplied at cost or less, or the remainder to

a large extent are making huge profits on body-work. **The cry of the trade is for simple and cheap bodies commensurate with the value and style of the chassis. It is not uncommon to discover that body-work in some cases costs quite as much as the entire chassis.**

As a contrast, the American Essex car at the show is priced complete at 510 pounds and chassis price is 465 pounds, a difference of only 45 pounds for the body work. This example should be seen, to appreciate thoroughly the obvious fact at both shows, that there is a wide divergency in the prices of ordinary open touring car body-work, which dealers and the trade generally are unable to understand.

The Trend from the Service Aspect

After a general survey of the medium and larger chassis it may be stated fairly that the trend towards accessibility is more in evidence than the former shows. There are two standpoints or viewpoints here involved. One may test for accessibility—which incidentally, mostly includes good design—either by noting the facilities for getting at its more importants parts—i. e., its wearing parts—or by noting the robustness—i. e., the area of working surface of the smaller details.

Manufacturing Economies

Generally regarded, the chassis at this show also indicate a common trend towards manufacturing economies as the first aim, and it may be hoped that all that follows from that idea as to materials and strength of section, have now an average of reasonable dependability. There is indeed some indirect reason to conclude that this result is realized, on reference to the improved layout of the accessory fittings, such as dynamos and ignition apparatus, lighting leads and the simpler looking switches and other controls mustered on the dash facia.

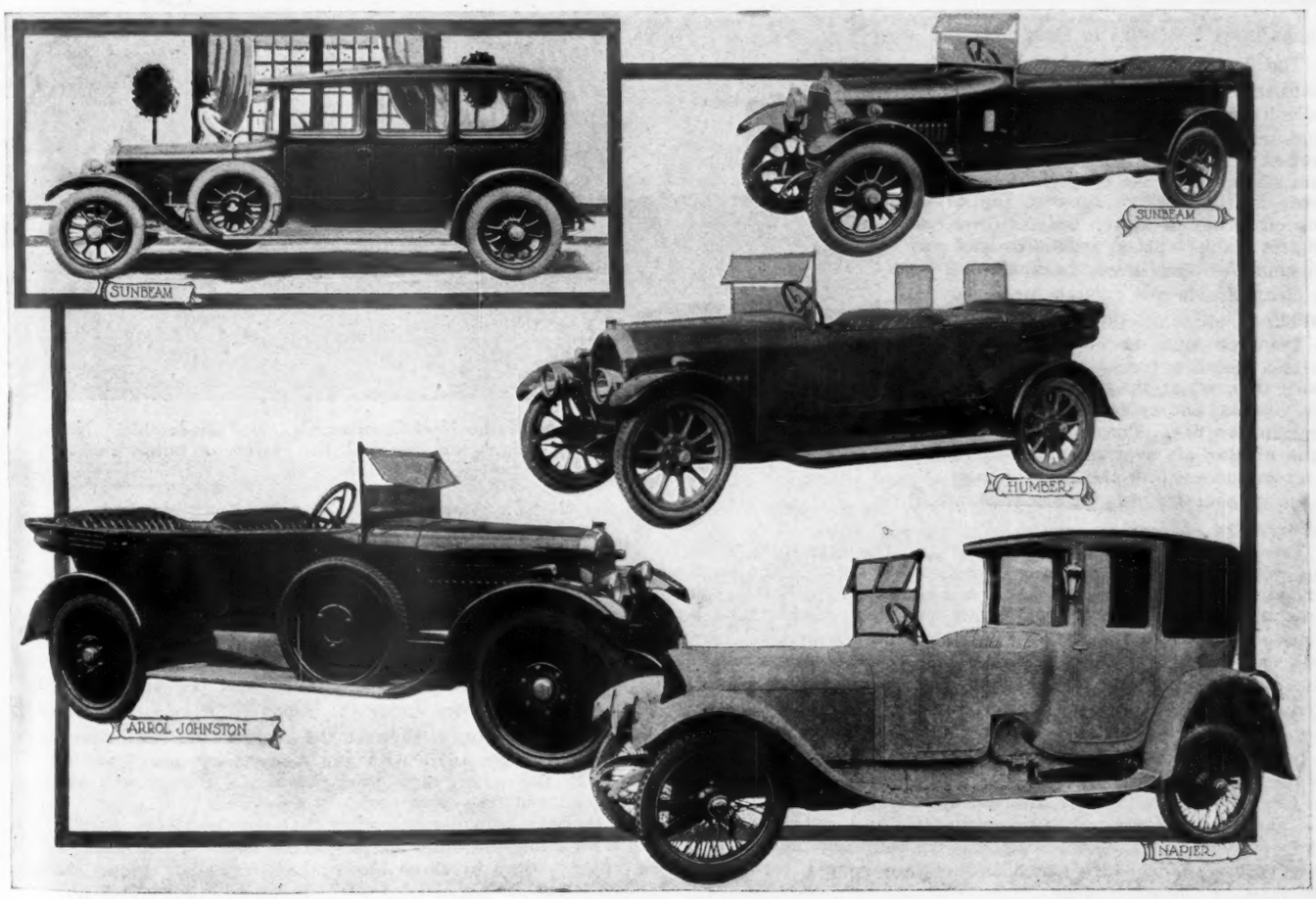
The Average Chassis Layout

First, it may be useful to summarize what seem the outstanding features in common of the large and medium chassis, irrespectively of the number of cylinders and their layout in crankcase. They may be categorized as follows:

(1) **Engine**—Cylinders en bloc, overhead valves in demountable heads, aluminum pistons of normal pattern, improved lubrication, chiefly to insure adequate oiling of the valves; higher placing of dynamos and to a less extent substituting a positive (mechanical) for a belt drive; vacuum gravity fuel feed and carbureters direct bolted to the cylinder jacket; gravity water circulation for poppet valve engines, and more efficient radiators and fans and fan drives.

(2) **Transmission**—The average modern transmission layout tends to develop single dry plate, fabric faced clutches, four-speed gear boxes with a self-contained central gate and ball socketed rocking change lever and either an unenclosed shaft with simple fabric disk flexible couplings or an enclosed shaft and torque tube, and a spiral bevel axle gear, which is now as predominant as en bloc cylinders.

(3) **Suspension, etc.**—The other details of a stereotyped modern chassis make-up are either a "cantilever" rear suspension (in hybrid form) or underslung leaf springs, direct side-by-side rear hub fabric-faced brakes, worm and full wheel (adjustable) steering gear with the foot brackets anchored above the chassis, until engines and gearboxes with three point anchorage and, in the majority of makes, enclosing also the clutch in a bell housing but, happily, not in all cases wholly enclosed; in many cases an unsupported rear end of the gear box.



In this group of British cars are shown the 24 hp. Sunbeam sedan with six-cylinder, 3⅛ by 5⅞ in., new overhead valve engine. The Sunbeam standard five-passenger 16 hp. touring model also employs the new overhead valve engine. In the middle is presented the 16 hp. Humber, 3⅛ by 5⅛ in,. five-passenger with hinged cowl and rear screens standard for 1922. The five-passenger, 16 hp. Arrol-Johnston has a larger body and higher hood for 1922. The 40 to 50 hp. Napier has an unusual type of body. The rear part is separate from the driver's seat and is suspended independently on C-shaped springs

Welding Is a Difficult But Essential Part of Blacksmithing

Iowa Dealers' Experience with Blacksmithing and Welding

Excerpt from report of Iowa Motor Trades Bureau convention held at Sioux City last week

ALL garagemen and repairmen equipped to do blacksmithing and welding are well satisfied with the result. It has proven a good investment. They have learned in the past year not to carry all their eggs in one basket. Now if car sales stop they have a branch of busines that keeps going along and cares for rent and living expenses.

ARTICLE 4 By R. C. JONES

WELDING is merely melting two surfaces, forcing them together, and letting them cool with the particles so intermingled that they are one solid piece. When properly made, a weld is as strong or stronger than the rest of the iron. When poorly made, it may be the cause of loss of life or permanent maiming of the one who trusts it.

Cleanliness Essential to Good Welding

The first requisite is a clean fire. No clinkers, ashes or unburned coal can be permitted. Rake out every one you can find. Then build your fire large enough to last through the whole process, as you can add nothing but clean coke and very little of that. Have close to the fire a big cigar box or starch box full of clean quartz sand — plain seashore such as locomotives and street cars use. Even a clean fire is not enough for a perfect weld.

The iron must be kept free from the oxides the fire forms on it. The sand does this. Coat the hot iron with sand by dipping, and sprinkle sand on it as it lies in the fire. The sand melts into a film of slag all over the iron, excluding air, and permitting the heat to melt the iron without forming oxides that would weaken the weld.

The forge in the service station of the Neel-Cadillac Co., in Philadelphia. Note the post vise, a big advantage, though not essential, the variety of tongs, and the excellent working light

Try a simple scarf weld. In it are all the principles to be followed when making more complicated welds. Thorough knowledge of this operation and common sense will tell you how to make nearly any weld you will ever need. Take a couple of ten-inch lengths of one-inch square iron and upset one end of each to about an inch and a half square. Next throw the "jump" (the upset) to one side, as shown in Fig. 1, and work it off to an agle or "scarf" on the largest bottom fuller, as shown in Fig. 2.

In doing this, be sure you make no deep dents in the face of the scarf which might hold slag, air or cinders in the weld. In case you dint it, lay the iron flat on the anvil, face up, with the end of the scarf a little overhanging and work the face down smooth again. When smooth, turn the edges down from the center so the scarf has a pronounced convex face. Do the same to the other piece.

Be careful in all this that you do not work the faces of the scarf too short. A short face is very apt to slip under the sledge, causing the weld to be smaller than the rest of the bar when finished. Within reason, the longer the faces are, the better, for the weld is given greater holding surface. Too long a face results in the same fault produced by too short a face—a weld narrower than the rest of the bar.

When the scarves are prepared, as shown in Fig. 3, clean your fire thoroughly, fit a pair of tongs to each piece, heat the pieces nearly white and dip them deep in the sand. Replace them in the fire, and sprinkle sand freely over them as you turn them over and over on the hot coal. Take your slice, and try to scratch the surface. When the iron is dazzling white and sparkling briskly, and the surface turns aside in little furrows under the slice, lift it vertically out of the fire—do not drag it through the coal. Have one helper lay one piece on the anvil with the face of the scarf up while you place the other, face down, upon it. Scrape and knock both clean and free from coal.

Let there be considerable offset between the pieces, as shown in Fig. 4. Let the other helper strike hard on the joint with the sledge. Two or three blows should make it stick. Don't let the blows be heavy enough to smash the weld much out of shape. If a second helper is not available, use the heaviest hand hammer you have.

Have everyone concerned know just what he is to do. A little rehearsal beforehand will improve the chances of success about 50 per cent.

The edges will very probably still be standing out, and a little away from one another after this first hammering. Work

them together with the hand hammer before the welding heat is entirely lost.

You will have noticed during the welding how the slag and molten iron flew from under the hammer. To achieve that result was the purpose of rounding the faces of the scarf. As the sledge struck, the rounded faces were flattened against one another, from the center outward, and the slag was thrown out, leaving nothing but pure iron in contact with pure iron. That means that the interior of the weld is as sound as the interior of the bar anywhere else.

The proof of how well you have welded the bar will be made in the next process, drawing out the jump where the weld was made. This must be done at a heat just below welding heat, where the iron is hot enough to move freely under the hammer, yet not so hot as to cause any remelting along the newly joined surfaces. Finish off smooth and square with the flatter, leaving just a trace of jump, not more than 1-16 in. above the surfaces of the bar. Grind or file this away. The weld should be invisible, or nearly so.

If a hairline shows, the job is fair, and may do all that is required of it. If any more than the finest hairline can be seen, it should be rejected. But if no trace of the joining can be found, and the bar supported by its ends cannot be broken at the weld, by the peen of the sledge striking hard on the weld, then the job is perfect.

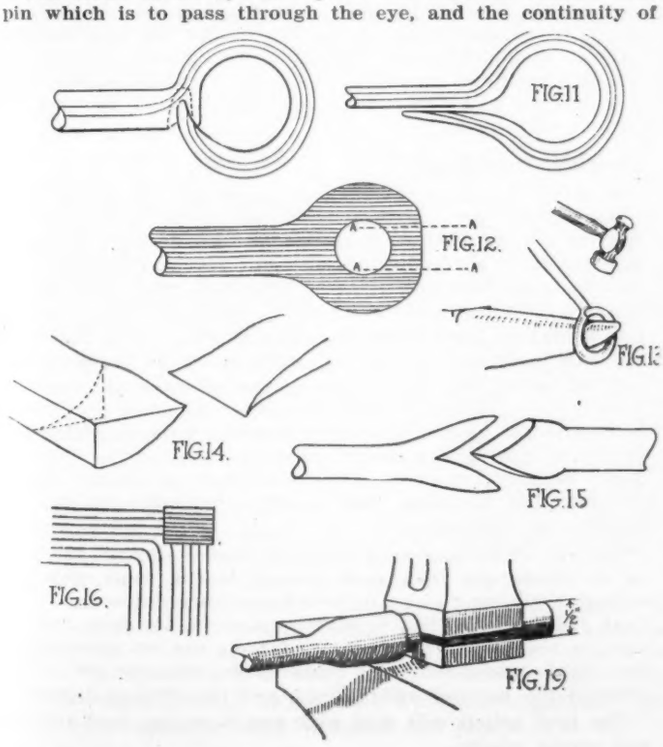
Various Kinds of Iron Welds

A butt weld is advisable only on very heavy stock, the two diameters of which are nearly equal, as in Fig. 5, where the pieces are shown ready to be welded, and Fig. 6, the unfinished weld. Such a weld is practicable only on short pieces, where the blow of the sledge is not absorbed by too much material between the point it strikes and the weld.

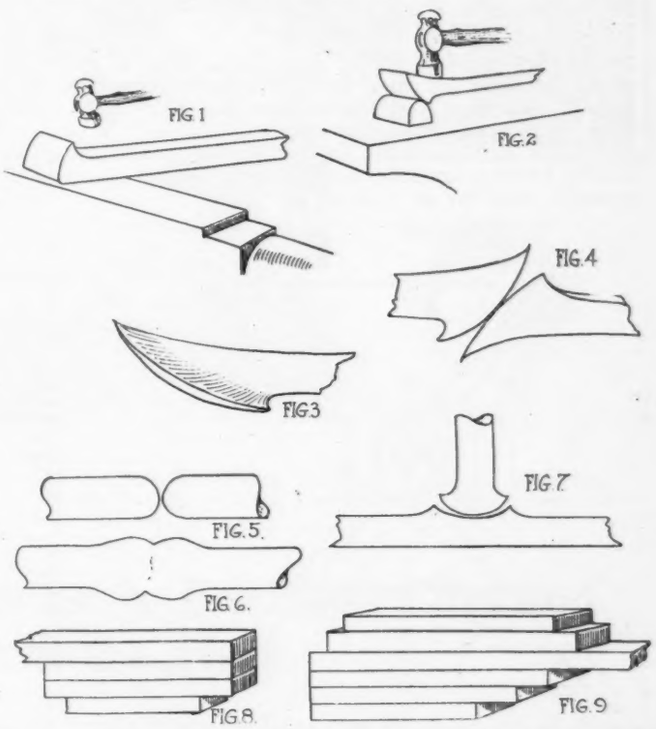
Fig. 7 shows a method of welding a bar to a plate. Here the bar is upset, shaped and cooled, and used as a top-fuller for shaping the recess into which it is to be welded. Take care that the recess has a flatter curve than the end of the bar, so that there will be room for the slag to be forced out. Figs. 8 and 9 show fagot welds, one of the most useful forms. When iron of the right size cannot be drawn down from a larger bar, or upset from a smaller, a lump of the required size is built up by layers.

Great care must be taken not to burn a fagot weld, for it is of necessity at high temperatures for a considerable time. Fig. 10 shows a better method of forging an eye on a rod than that shown in Fig. 11, while Fig. 12 is utterly wrong for any work where great stresses are to be encountered, as in torque-rods or brake rods.

The metal in the eye in Fig. 11 lies close all round to the pin which is to pass through the eye, and the continuity of the fibre has not been interrupted. Fig. 12 also preserves the continuous fibre, but does not give proper bearing surface, while Fig. 13 gives a circular bearing, but is apt to fracture along the lines through poor lateral cohesion of the fibres. Fig. 11 needs no upsetting before the weld, the only preparation being the fullering of the notch at the bend and the tapering of the end.



Again, be sure the fuller-nick is wider at the edges than the taper to be welded into it, so impurities may find their way out. This weld is finished over the horn of the anvil, as shown in Fig. 13. Two pieces to be welded at right angles are shaped as shown in Fig. 13, and the weld made in the usual way.



The metal spread by the preliminary drawing is used in finishing, to restore the full dimension lost by hammering while at welding heat.

A very strong weld, suitable for shafting, is made by drawing one piece to a wedge point, and splitting the other to a depth equal to the wedge's length, Fig. 15. All faces of the wedge and swallowtail are slightly rounded, and the faces forced together while in the fire, being lifted out a half minute or so after the blower has been shut off. Steady pressure on the ends with a few moderate blows will give a perfect union. In this, as in the butt weld, the blows must not be too heavy, or the ends are apt to bounce apart. The drawing and splitting of this weld usually furnish enough surplus material to provide for wedging and finishing down to the proper size.

When bending heavy stock to a sharp right angle, the fibres on the outside of the bend are very likely to break. Here a square piece, called a "dutchman," is welded in, giving plenty of material for a clean sharp corner, and making the bend stronger than ever (Fig. 16).

There are many other ways of preparing welds, which lack of space prevents our describing here. The application of these principles with careful thought and preparation will, however, equip you to cope with any job of welding that may be put up to you.

Welding Steel

Pure powdered borax is the flux used in welding steel, as much for its low fusing point as anything else, for steel welds at much lower temperatures than wrought iron. Also steel is more difficult to weld, and the alloy steels require much study and practice before success can be attained with them. Provide yourself a box to hold borax, and prepare your fire as for iron.

Shape up your steel at a cherry heat (seen in shadow) never letting it drop below a dark cherry, and never letting it go above a bright scarlet, from time to time sprinkling

sparingly with borax. Much care and practice are required to learn the correct amount of flux to use. Study this phase of welding carefully, and be successful with several practice welds before attempting work that is to withstand very heavy service. Beware of scaling.

If a piece of steel gives off great quantities of scale (as much as wrought iron), reject it. The life has been burned out of it, and it will fail in service, with possibly disastrous results. A trifling amount of scale is permissible, where the part is not to bear great stress, but steering gear parts, spring parts, etc., **must** be worked almost clean as a whistle. A few scales, of course, are unavoidable, but let no more than half a dozen fall from a vital part.

When all preparations are made, and your helpers thoroughly understand what they are to do, raise the temperature of the metal to the point where it changes from light red to yellow. Now proceed as with iron, working just as fast as accuracy permits, placing the first four or five blows lightly, to let the particles mix while the slag flies. Follow with heavier blows to consolidate the cooling parts. Finish as with wrought iron, but at steel heats.

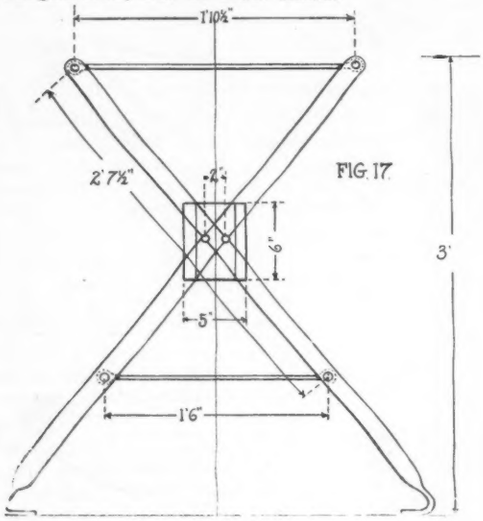


FIG. 17

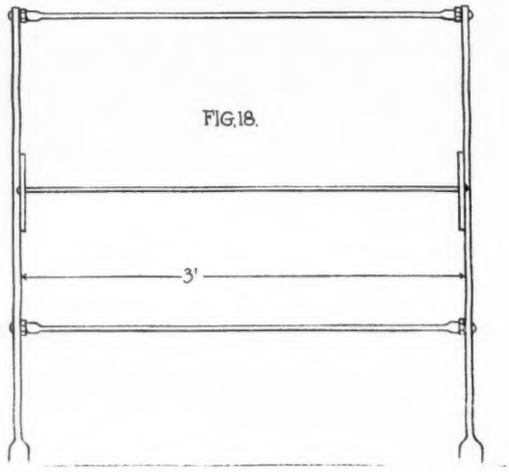


FIG. 18.

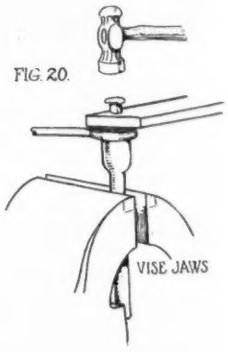


FIG. 20.

In all work with steel, particularly welding, be careful the temperature of the parts adjoining that worked on does not get too high. There is small danger of this with mild steel, but the difficulty increases with the carbon content, and some alloy steels are particularly tricky. Since so many of them are used in quantity in automobiles, the writer regrets that they cannot be dealt with here.

Making a Tool Rack

Directions for making a tool rack were promised in the last article. This job should be comparatively simple for the man who has put in practice the operations already described. The material needed is four 54-in. lengths of ⅜ by 2 in. wrought iron, two rods of 21 in., two of 27 in., six rods of 40 in., all rods a half-inch in diameter. Cross two of the flat bars on the bench, one and one-half feet between the end of the piece and the near edge of the piece crossing it, the distance between the shorter ends being two feet center to center. Mark the crossing on those faces that touch, and deepen the markings with the cold cutter so they will be visible when hot.

Do the same with the other pair. Get a heat on the short (now the upper) ends and round their edges off into a semicircle, as you rounded the point of your slice. Get a heat at the crossing marks, and work a quarter-inch deep to the shape shown in Fig. 18, starting with your smallest fuller and finishing with the hammer. Heat the lower ends, grip the end four inches in the vise, and with the wrench set 6½ in. from the end, twist through one-half revolution. Bend this twist to an angle of about 60 deg. with the length, three inches from the end.

Take your 21-in. rods, and weld an eye one-half inch in diameter in each end of both, the eyes to measure one foot and six inches center to center. Allowing one-half inch lap to weld will give this length. Should the rod come a trifle short, get a long heat on it, and swedge lightly all along the heat until it is drawn to length. If a trifle over, heat and chill it suddenly all over. Should this be insufficient, get a short heat behind each eye, cool the eye thoroughly, and upset a little just behind the eye. These operations should not be necessary, but are given as examples of how material may be economized by a little thought.

Do the same with the 27-in. rods, making the eyes one foot ten and a half inches center to center. Bore a 9/16-in. hole at the center of the semicircle worked on the upper end of one piece of flat stock, and another 27½ in. from it, measuring center to center. Using this piece as a jig, bore the others the same way. Cross them in their proper position, the surfaces prepared for welding against one another, lay the 27-in. rods with their eyes coinciding with the upper holes, the 21-in. rods in the same relation to the lower holes, and pin them with wooden pegs driven in, or wire them in place. Now the legs are held in their proper position.

Get a good welding heat at the cross, and weld them fast, working them down until they are the thickness of one piece all over the weld. Next heat up the piece of plate and the cross, and weld the plate in place, its corners meeting the middle line of each leg. Do not try to work the plate down into the legs. It does all that is required when it holds fast wherever it makes contact.

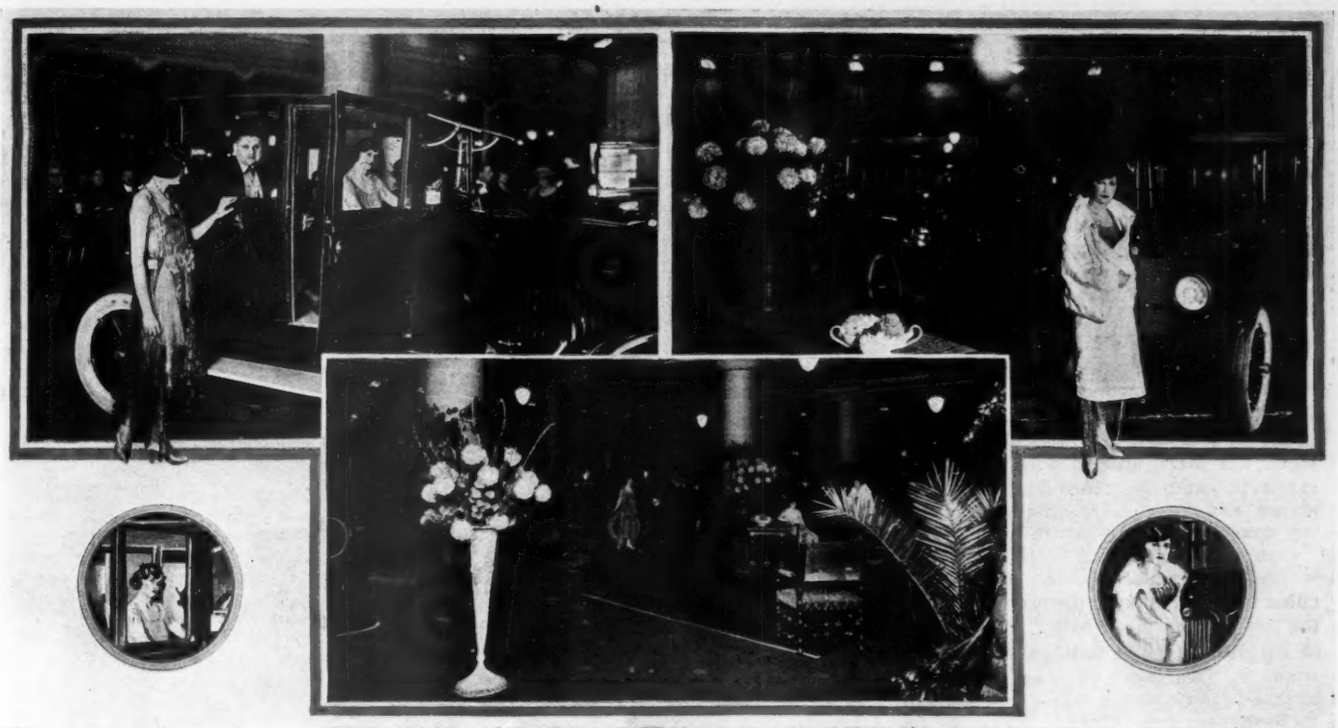
Locate the center of each plate, and horizontally on each side of the other bore a 9/16-in. hole, two inches center to center. On four of the 40-in. rods, upset about two inches of metal to a diameter of ¾ in. by heating the ends for four inches, cooling the end about two inches and ramming the end down hard on the anvil. Swedge a shoulder on this upset, 1½ in. from end, according to Fig. 19. Do this to both ends of four of the rods.

Shrinking Operations

Heat up the eyes, and in them insert the ends of the 40-in. rods, leaving one inch protruding beyond the face of the eye nearest the end. As soon as this distance is secured, plunge into the tank, shrinking the eye tight around the rod. When this is done, heat one of these projecting ends, and push it through the proper hole in the upper end of the leg, being sure the welded-on plate faces the frame of rods. Grip the rod in the vise just below the upset, and head up the hot projecting rod, as in Fig. 20. Now, heat up the other corner and rivet it in place in the same way. The lower frame of rods is now riveted to the legs in the same manner. Then the other pair of legs is fastened on the frame of rods just as the first was. Some bending out of shape will be involved in this second riveting, but no more than a little judicious heating and squaring-up will cure.

The two remaining 40-in. rods are pushed through the holes in the plate and their ends headed in the same way, just enough head being given to keep them from sliding out. Now heat and bend the feet to stand square on the floor, put the rack in place, hang your tongs astraddle the top bars and set the shanks and handles of your hardie, swedges and fullers through the parallel middle bars, and the rack is finished.

The next article will deal with punch-making, tool-dressing and spring repairs.



An artistic touch was given the enclosed car salon in the showrooms of the Studebaker Sales Co., Chicago, when four models dressed in the latest winter fashion creations strolled about the display of cars. This additional interest was the means of attracting many people

Milady Now Reviews the Latest in Enclosed Cars and Clothes at the Same Time

Style Exhibits Run in Conjunction with Automobile Shows Find a Popular Response from Men and Women

INJECTING the human element into a dealer's enclosed car salon by combining such an event with a style show, and with music, special decorations and other features introduced, is a novel idea that has been put over successfully by several of the largest Studebaker distributors in the country.

There have been many enclosed car salons in dealers' showrooms in the past, but it remained for Paul G. Hoffman, Studebaker distributor in Los Angeles, to add the necessary dramatic touch to an otherwise rather quiet affair. This was done by arranging locally to display the newest fashions on living models in conjunction with the showing of the latest Studebaker enclosed cars.

Many Cities Adopt the Plan

Judged by the size of the crowds that attended the affair in Mr. Hoffman's showrooms, and the number of cars sold, the salon was an unqualified success.

Then Chicago got the "bug." Not only that, but Chicago determined to go Mr. Hoffman one better by staging its closed car salon and winter style show on an even more pretentious scale. The idea next took hold in Cleveland, where the same kind of exhibit was in progress and as this is written Studebaker dealers in Pittsburgh, Dayton and Buffalo are the latest converts, with December 12 to 17 as the dates for the staging of the Pittsburgh and Dayton salon and style shows, and December 14 to 20 for the Buffalo affair.

The Chicago show drew visitors not only from the city but from points nearly 100 miles distant, all of whom were liberal with their praise not only of the idea itself, but of the attention given to even the smallest details, all under supervision of Henry R. Levy, president of the Studebaker Sales Co. of Chicago.

Fifteen thousand invitations to the affair were mailed, and this method of letting the public know about it and of inviting attendance was supplemented by a series of newspaper advertisements, four in number.

The only exterior evidence that something unusual was going on inside was a marquee stretched from the doorway of the building to the curb, thus symbolizing the fact that the Studebaker Sales Co. of Chicago was "at home" to the public during the week. A liveried doorman also took his position each afternoon and evening.

Favors Given

As an example of the attention paid to even the smallest details, a large yellow chrysanthemum was presented to every woman visiting the display, while cigars and cigarettes were provided for the men.

On the floor were exhibited the complete line of models. All of these were stock cars, even as to colors, trimmings and equipment. They were, in other words, exactly as received from the factories and as delivered to customers at the regular list prices—there was nothing of the "dolled up" appearance to them.

Music an Attraction

"Another reason for holding our enclosed car salon was that we felt the enclosed types of cars have attained such an important place today and have become so increasingly popular that they deserve a week of their own. Autumn is the logical time for such a show, although, as a matter of fact, enclosed cars have got beyond the stage where they are mere winter necessities. They are now in all-year-round use. Of course, with the approach of winter, more enclosed cars are purchased than at any other season," Levy stated.

"The main difference between the affair we held and other dealer exhibits of former years is that we, following the Los Angeles idea, introduced life, color and music into ours. This, of course, undoubtedly had a great deal to do with swelling the attendance, and yet our real purpose was to make the visit more interesting to those who paid their respects."

Dalton Combination Machine Performs Multiple Operations

THIS machine is designed to take the place of several machines. It is especially suitable for the small manufacturer, the portable machine shop and the automobile service station. Two operations can be performed at the same time by one operator, or two persons can work at the same time on different jobs.

Threads both English and metric can be cut on this machine when it is being used as a lathe.

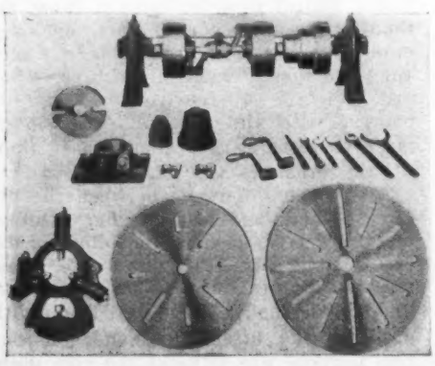
The bed is built with a removable gap block; is well braced with "U" cross supports, and is thoroughly seasoned before and after machining previous to the final finishing to insure accuracy.

Compact construction of the headstock is secured by passing the milling machine arbor support through and over the top of the headstock. The spindle of crucible steel is finished ground and runs in bearings of hard phosphor bronze. Adjustable dials graduated in thousandths are fitted. The milling table is provided with oil grooves and pockets and has three "T" slots.

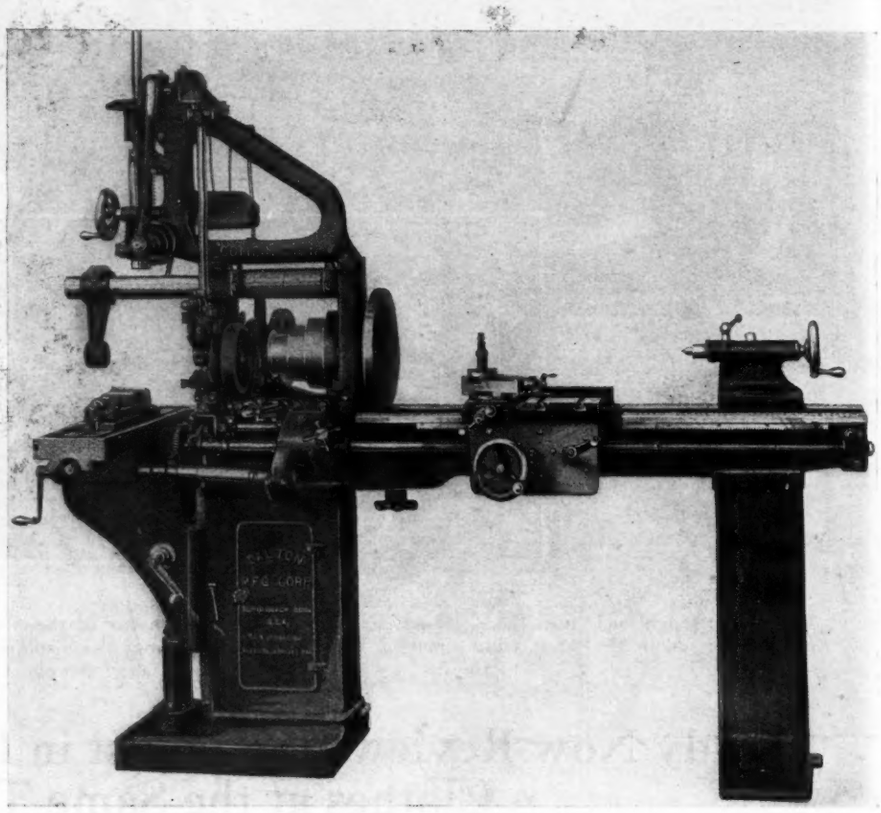
The feed screws and drill spindle are fitted with ball thrust bearings. All feeds are positive. Changes can be made on the milling machine without the use of loose gears. On the lathe the changes of feed are made by loose gears to the index plate furnished. The total length over all is 7 ft. 10 in.; total height to the top of the drill spindle is 6 ft. 5 in.; total width, 3 ft. 1½ in.; net weight, 2000 lbs. The lathe specifications are as follows:

Lathe Specifications

Swing over shears (gap block in), 13 in.
Swing over shears (gap block out), 18½ in.
Width of gap, 6½ in.
Swing over carriage, 8 in.
Swing over compound rest, 3⅛ in.
Turns between centers, 37 in.
Cross slide travels, 12 in.
Compound rest travels 2¾ in.
Centers, Morse taper, No. 2.
Back gear ratio, 6¾ to 1.
Diameter of spindle nose, 1⅞ in.
Length of spindle nose, 1 3/16 in.



Equipment supplied with the Dalton combination machine



The Dalton combination machine permits two operations to be performed at once or it can be used by two persons at once on different jobs

Spindle nose thread, U. S. S., 8 pitch.
Front bearing, 2 11/16 by 2⅞ in.
Back bearing, 2¼ by 3 in.
Tailstock spindle, 1⅜ by 8¼ in.
Tailstock spindle travel, 5 in.
Leadscrew diameter, 1 in.
Spindle speeds, 20 to 441.
Diameter large cone, 7½ in.
Diameter second cone, 5⅞ in.
Diameter small cone, 4¼ in.
Width of cone face, 2 2⅜ in.
For drive belt, 2 in.
Counter drive pulleys, 8 in. by 3⅛ in.
For belt (drive), 3 in.
Speed of counter, 250 r.p.m.

Horizontal Miller Specifications

Table feed (horizontal), 15 in.
Cross adjustment of table, 6¼ in.
Vertical adjustment of table, 13¼ in.
Center of spindle to overarm, 5 17/32 in.
Diameter of overarm, 2 7/16 in.
B. & S. taper hole in spindle, No. 10.
Feed changes to table, 3.
Feed (inch per rev. of spindle), .0058 to .0098.
Spindle speeds, 20 to 441 r.p.m.
Vise opens 3 in.

Drill Press and Vertical Milling Specifications

Drills to center of circle, 16 in.
Maximum distance of spindle to round table, 18 in.
Maximum distance of spindle to round milling table, 23 in.
Vertical adjustment with round table, 13¼ in.
Vertical adjustment with round milling table, 13¼ in.
Vertical travel of spindle, 9 in.
Diameter of round table, 15⅞ in.
Diameter of spindle in sleeve, 1⅜ in.
Pitch of gears, No. 8.
Spindle revolutions (open belt), 107 to 331.
Spindle revolutions (back gear in), 15 to 48.

The entire assembly shows that consideration has been given to appearance, general utility and workmanship. The units are of ample size to withstand the stresses imposed on the usual utility tool.

The materials used are in keeping with high-grade machine tool practice. The equipment, as regularly supplied, consists of two face plates, a slotted driver plate, round drilling table with base table base, plain milling vise, four clamp bolts, set of change gears for cutting both English and metric threads, set of wrenches, countershaft and one milling arbor. For indexing, a universal dividing head is furnished at an extra charge. The Dalton combination is driven by a direct connected motor of one and one-half horsepower. The Dalton Co., Sound Beach, Conn.

Mr. Dealer takes his Pen in Hand

More Accessible Design Is Wanted Here

SERVICE will never be what it should until some of the so-called mechanics and designing engineers who specialize in so-called "accessibility" lay aside their blue-prints and get into overalls in the general repairshop on a hot summer's day. Take the Winton car, for instance. Everything but the oil filler has been placed on the valve side. A mechanic with good eyesight can almost see the valve adjustments on 5, 6, 7, 8 and 9 valves but to get at them is another thing. It appears to me that by placing the generator pump water manifold and magneto on the opposite side, no added manufacturing expense would be experienced and accessibility would go up about 300 per cent.

Remove the front splash apron of a Nash Six, inspect and adjust the distributer of a Reo, tighten the clutch of a Dodge, replace the drive spring on the Cadillac fan, or replace the fan belt on a Nash Six! Also, how about removing the spark plugs from the later models of the Nash when the wrench has been lost?

To the designers of the above I would suggest that they work with them as a mechanic does.

So many engines or gearsets when viewed on test bench or in blue-print are models of accessibility, but place them in the chassis, add the starter and other equipment, place the body and hood in position, and accessibility vanishes. In my mind there is but one way in which the word "service" can be made to mean anything in the automotive world, and that is when the designers get together and find the weak points of the installation of various units which go to complete the modern automobile.

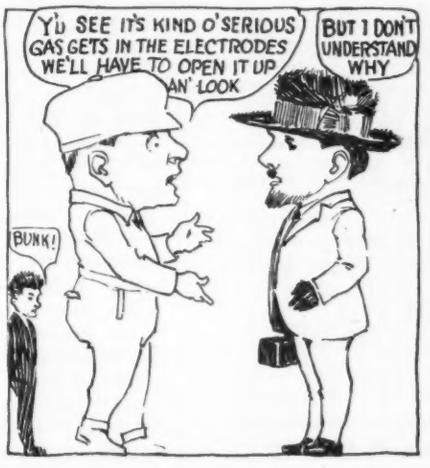
I trust I have made clear my point of view, which is that the automobile should be constructed so that real service can be given at a moderate cost.—D. A. McMuller, Modern Garage, Highland, Kan.

Which Is Good Business?

EDITOR, MOTOR AGE—Were it not for the fact that I have always preached the gopsel of truth in business, and always intend to, I would have no occasion to tell you of the incident which took place in a service station, and to which I was an interested party.

A recital of the events which transpired will best explain. I had made my call at a service station and was about to leave when a party having the bearing of a professional man entered and addressed himself to the shop foreman. The party in question was very much concerned over the operation of the electric system on his car. From what he said, I gathered that his car had been repaired in this shop but a few days before and had gone out in perfect running order. A new battery had been installed and new brushes were inserted in the generator. The old battery had suffered for a long time from continuous undercharging and, consequently, when the new battery was installed, the charge rate was given a slight boost and the electrical expert had set the charge rate too high. As a result, the battery was constantly gassing and water had to be poured in every day.

As was said before, the customer was a professional man, evidently a doctor. From his general appearance it was my impression that he would dislike very much to soil his fingertips making any



adjustments on his car himself, and he expressed his feelings similarly; but, although he was not the type who would care to repair his own car, he did seek information as to why it was not operating correctly. His questions were concise and to the point. It was plain to see that this doctor—I judged him to be one—had made a diagnosis in a very thorough manner, and he was likewise delving into the mysteries of the misfunctioning of his car.

So far we have merely introduced the subject. The point of the story is that the garage foreman who was attempting to explain matters to the doctor was doing an immense amount of talking but was saying nothing. He was hemming and and hawing all around the bush, so that the doctor's patience was fast spending itself. It was plain to see that a few more unanswered questions would put him in a mood that would forever condemn the garage as a suitable service station.

At this point I took the liberty to enter the conversation. Very briefly I explained to the doctor that the trouble was not at all serious, a mere adjustment of the third brush would remedy the whole difficulty, saying further that perhaps ten or fifteen minutes' work would be all that was necessary to have him on his way.

With this explanation the doctor was very much satisfied and strode off, saying that he would bring his car in the morning to have the adjustment taken care of.

After the doctor left the shop the foreman pounced on me and proceeded to read me the law as he knew it.

"You never want to tell 'em anything," was his first caustic comment. "Keep 'em in the dark. If you tell these birds too much they get the upper hold on you. It is best to keep 'em in the dark."

Thus he ran on for a considerable time and finally ended up by saying something to the effect that my statements had perhaps lost the house a few dollars which might probably have been paid by the doctor if he had not been told what the trouble was. Of course, I argued with this much upset shop foreman, but it did me little good. He had a one-track mind and apparently there were no switches in the track that would allow him to ever change his course.

Upon inquiring of the proprietor who the shop foreman was and what he had ever done, I learned that he had several times been in the service station business himself as sole owner of an establishment. Each venture had failed. His customers either became incensed and went elsewhere or left him altogether without a reason or explanation. The place at which he worked at the time of this episode he formerly owned, but had had to sell out because of his policy of "keeping 'em in the dark."

Apparently it had never entered the man's mind that a smaller profit many times from a contented customer is much better than a larger profit only once from a disgruntled customer. Had he made it his practice to tell the whole and absolute truth to his customers, their confidence would have been won to him and he probably would still be the proprietor of his own shop. Roy E. Berg, Chicago.

A middle western dealer in Fords makes a point of always washing and then polishing all new cars which are brought to him for any kind of service. This takes some extra time, but makes a splendid impression on all patrons, and is considered by the dealer as a practice entirely worth while.

MOTOR AGE

Reg. U. S. Pat. Off.

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A Merry Christmas

THIS is the time of the year when most of us like to look up some of the old books and again read "The Christmas Carol," "The Night Before Christmas" and other lesser known but perhaps as happily sentimental bits as these. It is a season when we are all inclined to be more charitable than at other seasons, and most of us will divide our more or less slender Christmas hoard with many persons we had not intended to remember.

It is a good practice, and Christmas really has a big influence on our daily life. We are all better for this bit of injected sentiment, and it is only too bad that we cannot carry this influence a bit longer into our regular daily life. Business would be much better if there was more of the fellow feeling — the Christmas spirit — in daily affairs.

This is not such a bad Christmas setting, after all. It is too bad that we are in the end of a business slump and there are many persons out of work, but there is some satisfaction in the fact that we are connected with an industry that has given the best possible account of itself in an employment and financial way during the year of the dark days. Also, that we belong to an industry that is rapidly on the upgrade.

But think in a broader sense. We have with us the best prospect for peace in the world that we have had for a long time. There is a good bit of sentiment in the consideration of the Irish settlement; the lessening of naval armaments, which is assured, is another step that meets with general approval; we are getting around to a much better international feeling in many ways; the steps toward having more business in government and less government in business have been long ones this year, and so it goes.

Altogether, it has been a mighty good year, and if you are among those in the automotive industry, you are to be congratulated. Let us all enjoy the season to its full extent and promise ourselves and our neighbors a better season another year.

Thinking in Millions

THE automotive industry has been thinking and talking in millions for several years, but how many of us realize how many is a million? To most of us the task of writing a million is merely the task of counting the zeros to see if we have enough. We do not stop to consider whether we or the reader will realize what we mean.

First, the capitalization of some of the manufacturing companies reached the millions; next, the registration of cars went into the millions; then, the annual sales figures of distributors put our merchants in the million-dollar class; for several years, our production has passed the million mark annually; even this year, the period of the big business blizzard, our production will run a million and a half vehicles.

So we think this editorial from the Chicago Journal of Commerce may be helpful to some who are thinking in terms of millions and wondering how many is a million:

> To realize how large a number 1,000,000 is, let us consider it in units of time.
>
> 1,000,000 minutes is 1 year and 10 months.
>
> 1,000,000 hours is 114 years.
>
> 1,000,000 days is 2714 years.
>
> We have hundreds (or it thousands?) of millionaires in this country. Next to time—that is, life—we value dollars in this commercial civilization. Let us figure 1,000,000 in both time and dollars, to see how long a period it requires, approximately, to save a million dollars at a certain daily saving, not counting Sundays. The figures show the following periods necessary:
>
> 640 years at $5 a day.
> 320 years at $10 a day.
> 140 years at $20 a day.
> 70 years at $40 a day.
> 32 years at $100 a day.
>
> But most men who accumulate a million dollars do so in fifteen years or less. After a period of education in money making that runs from twenty to twenty-five years, in which they secure, say $100,000, opportunity, vision and courage, with wide knowledge of conditions, enable them to touch the million mark. After that there is no limit. The first hundred thousand is the hardest to get, so perhaps most of us who are ambitious for riches should set $100,000 as the mark to reach before we are equipped to go after the big prizes of big business.
>
> Some of us, it may be said, are in such awe of very large figures, that $100,000, in the dim distance, looks like a great abundance.

Standardization of Danger Signs

A MOVEMENT for the standardization of danger signs along the highways is fathered by the American Association of State Highway Engineers. It is a part of the argument advanced that, in touring, the driver of an automobile sees almost as many sorts of danger signs as he enters states—and it might be added that even some states have different sorts in different localities.

In the interest of safety, it undoubtedly would be well to decide upon some sort of a danger sign and then use only this sign when danger is indicated. Make this sign

distinctive, so that it will be instantly recognized. Dealers should enter heartily into the promotion of this idea through their local and state organizations. It will require some pressure to change the signs in some communities, but it can be accomplished. The United States Bureau of Roads is encouraging this movement.

Reputation

IF THERE is any class of human that is akin in many respects to the traditional talkative woman, it is the automobile owner. The impressions gained by him have produced instant and vivid reactions. He as a class has "picked to pieces" the character of the dealer, the product he sells and the service he supplies. He has with even greater vehemence either dissected or eulogized your personnel. Even on his most casual contact with your organization he has exercised an alert ear, and an observing eye. The reactions of the eye and ear have impressed an opinion on his somewhat impessionable mind.

Sometimes he is guilty of rash judgment. His redeeming qualities are, that unlike the gossiping woman, he does possess an inherent charity and broadness of thought. He can be convinced of the integrity of your motives by "open covenants openly arrived at."

If your mechanical staff has finished a thorough and efficient overhaul on his car, he will show his gratitude by the sowing of favorable propaganda. By the same token, if the job was unsatisfactory, or if he has met with unfair treatment, he will sow unfavorable propaganda. The great family of other owners is the soil wherein these seeds are planted. The sentiments thus expressed by the individual owner produce preliminary impressions on each of his friends. The polarity of these impressions determine their basis of final judgment. If the sums of the impressions of each individual owner are added, they represent the standing of that institution in the community. They determine the reputation of the organization.

The presence or lack of reputation spell either success or failure.

Parking and Storage

IT is somewhat reassuring to hear from various sections of the country that dealer organizations are joining the motorist clubs in efforts to provide parking and storage facilities for motor cars. The lack of ability to park a car while the owner is attending to business deprives this owner of the use of the car for the part of his daily life for which it is most helpful, and for which he bought the car. There cannot possibly be any dispute of the statement that many cars are bought for business advantage and the recreational use is a by-product. These purchasers could not afford a car for purely recreational uses.

In Chicago an interesting experiment is being worked out in the use of public park space for the parking of cars. This park space, for the present at least, cannot be used for recreational purposes, which was the intent when it was made a park. So the South Park Board has instituted an automobile park venture. An admission of 25 cents is charged each time the car enters. Salesmen and others employed in the loop district have found this parking arrangement convenient, but the charge mounts some when it is necessary for them to take out their cars for errands several times a day. Parking on Chicago loop streets during the day is, of course, impossible.

Closely connected with this problem, is that of adequate storage space where the city dweller may put his car under shelter at a reasonable monthly charge. In many city sections throughout the country the charge for storage is entirely out of keeping with the investment necessary to properly shelter and safeguard a car and the owners are getting restless under the extortion.

There is opportunity here for automotive business associations to devise means whereby their customers—the car owners—may own cars and feel that they are getting fair treatment in connection with this ownership. Better and more economical ownership of a car is just as much of a service problem as the better and more economic design.

More Accessible Instrument Boards

IF there is anything which service men would welcome it is a better arrangement of chassis and body wiring so that the job of removing a body from a frame would not be so troublesome and require such an enormous amount of time. A manager of a car painting department recently said that one of the biggest items of expense to the customer on a repaint job was the disconnecting and reinstallation of the chassis and body wiring.

It not only applies to the wiring but to other things, like oil pipes, speedometer connections, steering gear, etc. Hardly any two makers use the same layout, and, therefore, different methods of operating have to be adopted for each make of car.

The job of disconnecting and replacing the instruments on the dashboard could be greatly helped if makers would use a few inches more of wire, cable, tubing, etc., on the instruments so that the panel in which these instruments usually are set could be removed and pulled far enough away from the dash to permit a mechanic to work easily on them.

In some instances where the fuel tank is placed in the cowl, the tank must first be taken out before any work can be done on the connections to the instruments. A suggestion here might be to hinge the instrument board so that the back could be brought down into comfortable working position. This also would allow ready inspection of switch connections, ammeter, oil gage, etc.

The troubles common to the instruments usually are of a minor nature, but what makes the repair bills mount so rapidly is the difficulty of getting at these troubles.

Plug Fouling

IT IS AN undeniable fact that there has been an epidemic of plug fouling and crankcase dilution. It has afflicted cars of all price classes. In some cases the oil manufacturers have been blamed.

Cases of plug fouling that bore several of the earmarks of improper lubrication have now been correctly diagnosed, with the result that the oil proper as an offender has been exonerated. The car makers are aware of these conditions and all are working on corrective designs. Greater knowledge of the problems of low-grade fuel vaporization and the recent improvements in aluminum piston design have helped greatly towards an elimination of this bugbear. The service stations have paid a heavy toll in the replacement of hundreds of pistons and thousands of piston rings and spark plugs. Usually the relief was only temporary. The old symptoms reappeared in a few thousand miles.

That a permanent cure is in sight is evidenced by the fact that one prominent car maker has announced in an official guarantee that his product will be free from plug fouling for a period of 15,000 miles.

Truck Sales Promise Well for 1922

Keen Competition Leading Toward Greater Car Values

Reduction of Costs in All Branches of Industry Will Feature 1922 Production

NEW YORK, Dec. 20—Most of the manufacturing companies in the automotive field will take advantage of the holiday period to take their annual inventory. All of them are preparing, however, to resume operations Jan. 2, on schedules fully as large as those now in force, and are confident that it will be necessary to expand their output steadily as the new year progresses. It is almost universally true that the inventory position is much more satisfactory than it was a year ago. Most companies have taken their losses and many of them have balanced the supplies on hand.

The belief is general among parts manufacturers and those who supply car and truck manufacturers with materials that substantial orders will be given very soon. Rock bottom prices are being given on materials ordered at this time, and it is improbable they will go much lower for a long time to come. Some of the parts manufacturers are quoting prices which will allow them only a very small margin of profit, in order to operate their plants more nearly at capacity.

The subject of costs is one which is being given exceedingly careful attention in all branches of the industry. Competition is keen and manufacturers realize that purchasers must be given greater value for their money than has been the case in the past few years. Every effort is being made to effect economies in factory production costs and to keep down overhead expenses. One of the means to this end which is being taken up seriously by the larger manufacturers is the elimination of distributors and direct dealings with dealers through factory branches.

Another important trend is toward the development of light cars of high quality. Some of the newcomers in the field propose to meet this demand with six-cylinder cars of good body work and excellent material throughout. Some of the older manufacturers who have specialized in the heavier cars will expand their lines to include lighter models. This would give an excellent argument to the manufacturers who propose to insist on having their dealers handle their own lines exclusively. If they can provide a dealer with both a light and a heavy car, they will contend there is no reason why he should take on another make. A large number of these new models will be displayed at the New York and Chicago shows.

As the year comes to an end it has become certain that production will exceed the most optimistic forecasts at the beginning of the year and the most careful estimate still stands at approximately 1,700,000 for American producers of passenger cars and trucks. This record has been exceeded by the industry in only three years, and it is only about half a million less than in 1920.

The outlook for production and sales in 1922 continues problematical. Most manufacturers believe business will be better, but many of them hold to the belief that sales, especially of passenger cars, will not be much larger in 1922 than they have been in the past year. The outlook for truck sales, however, is more promising, and the market will expand gradually as general business conditions return to normal.

Lincoln Motor Company's and Receiver's Report Differ Widely

Detroit, Dec. 19—The receiver's appraisal of the Lincoln Motor Co.'s assets differs widely from the amount set by the company in its report at the time it was placed in receivership. The figure announced today after appraisal by the receiver shows assets of $9,490,811 while the company's report estimated $15,061,492.

Liabilities are given as $9,073,105 which does not include the claim of the government for income and excess profits taxes of $4,500,000, Class A stock outstanding to the amount of $7,313,600, and liability for uncompleted contracts estimated at $1,500,000, which would make a total of $22,804,411.

In the court appraisal total current assets are reduced from $4,797,203 to $2,697,137, while land account was increased from $1,562,743 to $1,709,401, and buildings was cut from $4,389,197 to $1,872,863. Machinery, plant, and equipment tools, etc., were all reduced in the court appraisal.

The liabilities include accounts payable, $1,276,470; notes payable, $4,930,476; first mortgage bonds, $1,882,000; accrued pay rolls, unclaimed wages, and other items to the amount of $9,073,105.

Hearing is now in progress at Washington in the treasury department upon the government's claim of taxes amounting to $4,500,000.

REO TAXI AT SHOW

Detroit, Dec. 20—The Reo Motor Car Co. has developed a special taxi chassis which will be shown for the first time in the New York Reo branch the week of the New York show. The model is designed to meet the rough use to which a taxicab is subjected, with special attention to acceleration and brakes. The model is the design of H. T. Thomas, Reo engineer.

Buckeyes Grow Optimistic at Big Trade Convention

Accessory Men Think That Coming Year Will Mark Turn for Better Business

COLUMBUS, O., Dec. 17—Interest at the fifth annual meeting of the Ohio Automotive Trade Assn., held in Columbus, Dec. 13-16, centered around the prospects for business in 1922.

Optimism was the keynote of the meeting. It was the consensus of the convention that the worst of the slump was over and business definitely on the upgrade.

All of the speakers on the program stressed the importance of hard work and better merchandising methods. In fact, all agreed that if a dealer in any branch of the automotive trade is to succeed in 1922 he must work long hours and honestly try to solve the many problems which now confront him.

One of the features was the educational display of automotive equipment and accessories which occupied the entire Memorial building.

The four reasons for the continued growth of the association were summed up by Secretary E. J. Shover as follows: need for legislative activity to protect the industry; friendlier conduct of one dealer towards the other, and of the dealer towards the public, and better business methods and practices.

Alfred Reeves, general manager, National Automobile Chamber of Commerce, spoke at length on "What the Future Offers to Dealers in the Automotive Industry." In this talk he summed up conditions as he sees them, and believes that the year 1922 will be a fairly good one. He is rather optimistic, although he cautioned the dealers to improve their merchandising methods.

Officers for the coming year are: Y. B. Jones, Columbus, president; C. B. Ratterman, Cincinnati, first vice-president; H. G. Wiley, Springfield, second vice-president; E. C. Brisley, Columbus, treasurer.

SPRING BUSINESS COMES EARLY

Toledo, Dec. 16—Two trains left here recently for Atlantic and Pacific coasts, each carrying Overlands and Willys-Knight cars to dealers, valued at $1,275,000. The shipment to the east consisted of 100 cars and in them were 615 motor vehicles for New York, Boston and Philadelphia. The western shipment contained 80 cars carrying 281 Overlands and 109 Willys-Knights.

Winter sales coming into Willys-Overland offices here indicate that spring business will begin early and continue strong.

Year's Sales Approximate 1,700,000

Many Lines Lose Dealers in Changes on West Coast

More Old Organizations Drop Out of Business Than for Many Seasons

LOS ANGELES, Dec. 17—More pronounced changes in the motor car industry have marked this month than have been known in the same length of time in many years. Dealers who have been in business for years have dropped out overnight, as it were. With few exceptions there is a noticeable lack of others springing up to replace them.

The Chevrolet Motor Co. that conducted a factory branch in a four-story building, one of the largest exclusive structures in the city, has adopted a policy of district dealerships and given up its building. The Baldwin Motor Company, located two blocks away, has been made the dealer for the territory formerly served direct by the branch. Baldwin formerly handled the Saxon, Columbia and Oldsmobile commercial car. The Chevrolet branch home has been occupied by the Reo factory branch.

The Warner Motors Co., distributor for the Mitchell line for about three years, has passed out. A. E. Evans & Co., who distributed the Paige, have been dropped, and the Paige Co. of Southern California organized to take over the business as a factory branch of the Paige-Detroit Motor Car Co. This change will prove a decided surprise to the trade, as well as owners of Paige cars.

Lynn C. Buxton, who distributed the Stearns for many years, took on the Haynes line recently and the California Stearns Co. has been organized to represent the Stearns. The available stock of Scripps-Booth cars on hand has been taken over by the Thomason Motor Car Co., formerly used car dealers, who also cleaned out the Metz stock here. The passing of the Briscoe has been followed by the announcement that H. J. Wurzburger, the distributor, will handle the Earl, and that the first shipment of Earl cars has been received. The Pelton Motor Co. now represents the Marmon, succeeding the Al. G. Faulkner Co., that was supplanted by a receivership.

Trade Association Petitions Makers in Anti-Bonus War

Newark, N. J., Dec. 19—The board of trustees of the Newark Automobile Trade Assn. has adopted a resolution in which it asserts that the automobile business throughout the country is being harried to a considerable extent by the practice of certain manufacturers in offering special bonuses to be used as additional discounts when trading in used cars.

The resolution states that investigation shows that these special bonuses are exerting a demoralizing influence, and, as a consequence, the custom is "most heartily condemned" by the association. Copies of the resolution will be sent to every motor vehicle manufacturer in the country with the request that these bonuses be discontinued so that business conditions may be more quickly stabilized.

Jordan Heads Traffic and Safety Campaign of N. A. C. C.

New York, Dec. 17—Edward S. Jordan, president of the Jordan Motor Car Co., has been appointed special representative in traffic and safety by the highway committee of the National Automobile Chamber of Commerce. He has been actively engaged in the promotion of safety work with relation to the highways.

"Education saves lives of children," Jordan says. "We can accomplish most by working through the schools. We must speak for severe penalties on speeding and careless driving, but we can bring about the best results in training the children in safe behavior on the streets and providing playgrounds for their leisure hours."

A survey shows that accidents in many of the larger cities of the country have been reduced appreciably through an educational campaign.

DETROIT SHOW JAN. 21-28

Detroit, Dec. 19—Detroit's automobile show will be held Jan. 21 to 28 in the Morgan & Wright branch plant here of the United States Tire Co., the same building as housed the 1921 show and one of the most imposing structures in the city. It is centrally located and will give ample scope to a complete display of the product of the industry.

Manager H. H. Shuart, of the Detroit Automobile Dealers' Assn., who has conducted all of the shows held in this city under the auspices of the association, is again in charge. Drawing for exhibition space will be held Dec. 27, and non-members of the association will be allotted space the following day.

CHANDLER DECLARES DIVIDEND

New York, Dec. 17—The directors of the Chandler Motor Car Co., at a meeting in Cleveland yesterday, declared the regular quarterly dividend of $1.50 a share payable Jan. 1 to stockholders of record Dec. 24. By this action they fooled the speculators who had been predicting that the dividend would be passed and who sold the stock short. The price declined to 45½ Monday, but sold up to 52 yesterday. It is understood that the Chandler company did not earn the dividend, but paid it out of surplus. It is felt that the earnings in the next quarter will justify this action.

Total Production for 1921 Will Approximate 1,700,000

Actual Figures Will Exceed Estimates Made Year Ago by 200,000

NEW YORK, Dec. 20—Careful estimates of the total production of motor vehicles by American companies for 1921 indicate that the final figure will approximate 1,700,000. This will include the foreign assembling of cars by Ford and other American companies which have assembly plants in other countries.

Domestic production will aggregate 1,604,000. The domestic production for the first nine months of the year aggregated 1,200,000. The estimated domestic production for the last quarter, with figures for October and November practically complete, is 403,000. In all instances the figures include both passenber cars and trucks.

The total production for 1920 was 2,205,000, so that the output for this year will be only approximately half a million less than in 1920. The most optimistic estimates made at the beginning of 1921 did not exceed 1,500,000.

October Production of Cars and Trucks Over 150,000

Washington, Dec. 16—Production of passenger automobiles and trucks in the United States for October by companies representing more than 90 per cent of the output of the industry was approximately 150,000.

DURANT PRODUCTION DATES

New York, Dec. 15—It is expected that the Durant Motor Car Co. of Indiana will begin production of the new Durant six about Jan. 15. Production of the Durant four already has begun on a small scale at the Lansing plant, and the Durant Motor Car Co. of Michigan proposes to turn out about 500 cars before the end of the year. Production in the Oakland plant of the Durant Motor Car Co. of California probably will begin in April.

TRADE QUICKENS IN CLEVELAND

Cleveland, Dec. 16—The average retail automobile dealer in this city has experienced a quickening of buying in the first part of December. That is the most important development here in the industry in the last few months.

TEXAS SALES HOLD UP

Dallas, Tex., Dec. 16—The automobile business during the first 15 days of the last month of the year was said by retailers here to be about as good as that of any 15 days of the year.

10 Counties in Gotham Field Start December Sales High

First Week Leads Any in November But Show Proximity Makes Contracts Difficult

NEW YORK, Dec. 18—Though a fairly good run of pre-Christmas buying has helped to stimulate business this month, the New York passenger car market, generally speaking, is in its usual condition this time of year of waiting to see what is new at the shows. Most dealers have had a better week in December than the average November week, but they do not expect the month as a whole to come up to November because after the fifteenth, or at the latest the twentieth, virtually no Christmas sales are made and the show is so near that it is difficult to get contracts signed.

November registration of new cars in 10 counties in and around New York, as reported to dealers by Sherlock & Arnold, publishers of the Automobile Sales Analysis, were 2,793, as compared with 3,931 in October. The summary of the year to date follows:

	Approximately Below $2,500	Approximately Above $2,500	Total
Jan.	483	146	629
Feb.	1,409	210	1,619
March	3,396	488	3,884
April	4,811	575	5,382
May	5,468	584	6,052
June	6,522	495	7,017
July	5,457	386	5,843
Aug.	4,216	350	4,566
Sept.	4,004	331	4,335
Oct.	3,505	426	3,931
Nov.	2,425	368	2,793
Total to date	41,732	4,359	46,091

PARRETT ELECTED PRESIDENT

Chicago, Dec. 17—Dent Parrett has been elected president of the Hicks Parrett Tractor Co. by the board of directors. Parrett has long been identified with the tractor industry. He was the originator of the Parrett tractor and founder of the producing company. During the war he was disassociated with this work through his activities at the Holt plant in Peoria and the Chandler plant at Cleveland where he served in the capacity of major.

Since the war Parrett has devoted his time to working out engineering plans for tractor improvements and the development of a combination light tractor and cultivator to be sold at a price around $600. This model, with the improved models of the Parrett three and four-plow tractors, will be shown at the National Tractor show at Minneapolis in February.

ERIE SHOW UNDER WAY

Erie, Pa., Dec. 19—While the dates of the Erie (Pa.) Automobile Show are only now being announced, plans for the show have been under way for several months past, and details of the show, which is to be held Jan. 30 to Feb. 4, are about completed.

The Erie Automotive Assn., which conducts the show, is a 100 per cent organization of automobile dealers of the Erie district. Thousands of dollars are being spent for advertising and publicity within a radius of 100 miles of the city. Other civic bodies assist the automotive association in making the show one of the big annual civic affairs.

Erie dealers report that business has been fair and is showing much improvement at this time, many sales being made for spring delivery.

Trucks Feed Ancient River Queen

MEMPHIS, Tenn., Dec. 20—Owners of the "Kate Adams," a river steamer plying the Mississippi river in the Memphis territory for the last 23 years, claim an individual feature in its truck lines from various points along the river. The truck lines were opened more than eight months ago. The owners of the "Kate Adams" operate truck lines from Friar's Point, Miss., to a distance of 20 miles from Rosedale, Miss., and from Arkansas City, its southern terminal, to a distance of 60 miles. The "Kate Adams" is one of the oldest side-wheelers. The vessel leaves Memphis every Monday and Thursday, laden with passengers and freight.

Gray Motor Corp. to Have Two Cars Ready Show Week

Detroit, Dec. 19—Gray Motor Corp. will exhibit two cars at the Commodore during the week of the New York show, which it is reported will sell under $500. Drawings of the car seen in the offices of the company indicate a very high class looking product, more commodious than the usual run of cars in the extreme low priced class.

The plan of the company to assemble the car in assembly branches in principal cities of the country means that it will be a specialized unit vehicle and specifications are being placed with leading unit parts makers seeking the highest possible construction value in the price class.

If the plans of the company are carried through, unit parts makers will have an opportunity to participate in the manufacture of a car in the bottom price class, which to this time practically has been limited to cars of "all under one roof" construction. This applies to the engine as well as the other parts, as no feature of the car has been definitely decided upon yet.

EUGENE DEALERS ORGANIZE

Eugene, Ore., Dec. 16—An automobile association has been organized here by the associated automobile dealers, garage, battery men and tire distributors in order to further mutual interests. It is also planned to hold an annual automobile show.

Brisk Sales Mark Year's Close for Chicago Dealers

December Business Proves Much Better Than Preceding Month; Truck Market Livens Up

CHICAGO, Dec. 17—Daily rains for the past 30 days in Chicago territory have rendered Illinois dirt roads almost impassable and Illinois, of course, has a fine system of hard surface roads, but most of the people are on the other kind. This fact more than any other has cut sales of automobiles in this district. This condition is true of the Chicago market outside of the city itself. Sales in Chicago during the first two weeks of December were spotty in the extreme and seem to have responded in proportion to the effort put forth by the dealers. Organizations that have tuned up to meet present conditions of more difficult sales report satisfactory business. Illustrating this point of changed selling conditions, one dealer said to MOTOR AGE:

"Our sales for the first two weeks of December have been fine. We have sold more cars this month than we sold during the entire month of November, but it has been hard work. I never thought that I would work so hard. Yesterday I spent four hours with a prospect. A year ago such a thing was not heard of in this organization. I made the sale, and was worn out by the time I had the contract signed. We do not have easy sales any more; but, honestly, I believe I am going to like the spirit of the new conditions and that I will be able to find more real satisfaction in my business as I get closer to it, and that is what I have to do. Get close to it and stay there."

Many of the city sales have been purely Christmas or gift sales. These have added materially to the volume, and it is said by dealers, judging from prospects now in sight, that sales will keep up at a fair rate until a few days before Christmas.

With most dealers in Chicago, sales have shown better than for any two weeks in November, and in many cases December to date has produced more sales than the whole of last month. No one class of car is particularly in the lead in the Chicago market. Chicago plays its favorites in particular classes, but is not confining itself to cars of any set price.

One of the bright spots in the local situation is the remarkable activity in motor trucks. Light capacity vehicles are in demand, and these sales have been not unusual for some time. Heavy capacity trucks have been slow to move, and this is true of the whole line excepting Pierce-Arrows. About the first of December a demand began for these trucks and December so far has registered more sales than any one whole month during the last 18. The reason given for these sales is that many truck sales organizations have virtually closed

shop, that many manufacturers are out of business and that competition, perhaps, is so much less active as to account for increased sales in the organization that has been on the job all the time.

Manufacturing in Chicago of trucks is on a very low schedule, with hopes for an increase after the turn of the year. Some of the makers promise to enter a capacity schedule after Jan. 1.

The year's business in Chicago has been fairly satisfactory in the main, decidedly so in exceptional cases such as Cadillac, Studebaker, Buick, Dodge and others. The year has left its mark on the trade, many good things have been learned and, almost without exception, dealers look forward to 1922 with confidence of good business to be had if the lessons of 1921 are kept in mind.

DENBY AND COBB SPEAKERS

New York, Dec. 16—Secretary of the Navy Denby, who formerly was one of the principal owners of the Denby Motor Truck Co., will be the guest of honor at the annual dinner of the National Automobile Chamber of Commerce, which will be held at the Commodore, Tuesday evening, Jan. 10. The only other speaker of the evening will be Irvin S. Cobb, the celebrated humorist. Col. Charles Clifton, president of the N. A. C. C., will preside as toastmaster. The arrangements for the dinner are in charge of a committee of which Pierre S. DuPont, president of the General Motors Corp., is chairman. Associated with him are A. R. Erskine, Alvin Macauley, David S. Ludlum, William Robert Wilson, W. C. Marmon and A. G. Seiberling.

OAKLANDS ONLY NEW MODELS

Detroit, Dec. 16—The Oakland car of General Motors line will be redesigned along the lines of the sport model recently introduced, which has proved to be the popular member of the Oakland family and mainly responsible for that company's continued high production. New models in all Oaklands will be shown at the New York show, all showing the sport features, and these will be the only new models exhibited by any General Motors unit. A production of 18,000 Oaklands has been set for the first eight months of 1922.

FREIGHT RATES TO BOOST SALES

Topeka, Kan., Dec. 16—Reduction of 16 per cent in freight rates on grain and hay recently ordered by the Interstate Commerce Commission, is expected by Kansas motor car dealers to have an excellent effect on business during the winter and to stimulate buying next spring.

TRACTOR COURSE AT PEORIA

Chicago, Dec. 18—The Bradley Polytechnic Institute, Peoria, Ill., is offering a four-, eight- or twelve-week course in tractor construction, operation and service. The twelve-week course includes farm mechanic-

N.A.D.A. Offers Changes in Dealer Contract to N.A.C.C.

New Clauses Cover Allotment of Cars and Cancellations—Also Includes Distributors

NEW YORK, Dec. 16—Following a number of meetings of representatives from the National Automobile Dealers' Assn. with those from the National Automobile Chamber of Commerce, the directors have just transmitted to automobile manufacturers certain suggestions for changes in contracts which the dealers believe will prove mutually beneficial in the distribution of motor cars.

They have to do with the allotment of motor vehicles and cancellations. While these changes proposed by the dealers are suggestions only, they are, in the opinion of the N. A. C. C. directors, proper ones for consideration by those who are in the manufacture and distribution of motor cars and motor trucks. Text of the proposed changes is as follows:

Allotment of Motor Vehicles

The distributor must furnish to the manufacturer an order for motor vehicles for the period of 12 months in advance for distribution in his territory, covering the allotment of models by months. The manufacturer may ship motor vehicles according to such statement unless the distributor shall notify the manufacturer from 60 to 90 days in advance of a change in the shipping schedule for any month or months. By the giving of such notice, unfilled shipments may be automatically cancelled; provided, however, that every distributor must, during each quarter of the contract year, take at least 50 per cent of his aggregate order for such quarter.

If, for any reason, the manufacturer does not ship during any month the orders specified for that month, such unshipped orders for that month may be automatically cancelled by the manufacturer and be deducted from the allotment to the distributor as specified for that month, and in such case the manufacturer and distributor will be released from any further liability for such month on such unfilled order.

Any orders submitted by the distributor in excess of the monthly allotment as above provided, may be accepted by the manufacturer at his option and, when so accepted, shall be deemed to be subject to all the conditions to which motor vehicles ordered by annual allotment are subject.

Cancellation

This agreement shall remain in force and effect until cancelled or terminated with or without cause by the giving of notice by either party to the other party in writing of 15 to 30 days, and at the end of the time specified in such notice, this agreement shall be deemed to be in all respects cancelled and terminated.

In the event of a cancellation or termination of this agreement, such cancellation or termination shall be the act of a corporate officer, sales manager or other person duly authorized to cancel or terminate sales agreements.

It is agreed that in the event of the cancellation or the termination of this agreement by the manufacturer that said manufacturer obligates himself to repurchase at the net prices originally charged to the distributor, the distributor's stock of new saleable cars of regular models of the current serial year shipped by manufacturer within six months before, and such parts as were originally purchased by the distributor from the manufacturer, which cars or parts are in the hands of the distributor at the date of said cancellation by the manufacturer.

In the event of the cancellation of this agreement by the distributor, the manufacturer at his option may purchase such stock of new motor vehicles or parts, sold by him to said distributor and on hand at the date of the cancellation or termination of this agreement by said distributor.

It is agreed that the distributor shall furnish the manufacturer semi-annually in each contract year an inventory of parts on hand and shall return such parts to the manufacturer as may comprise an overstock in the hands of the distributor, or which the manufacturer has declared to be obsolete.

The suggestions above apply also from the distributor to the dealer.

ASKS PREMIER RECEIVERSHIP

Indianapolis, Dec. 16—Suit asking that a receiver by appointed to take charge of the Premier Motor Corp. has been brought in Superior Court here by Hiram A. Whitman of Chicago on promissory notes aggregating $4000. That the suit and petition for a receivership was brought to hasten the reorganization of the concern that is under way was asserted by Quincy A. Myers, attorney for Whitman. This statement was later borne out by I. F. Schaeffer, secretary and treasurer of the corporation.

Myers, attorney for Whitman, declared that the company has assets of $2,000,000 in access of its liabilities.

FORDS FOR WAGE EARNERS

Decatur, Ill., Dec. 16—To stimulate the sale of Ford cars among wage earners, J. G. Starr & Son, of Decatur, Ill., has decided upon a savings deposit plan which is meeting with success. Every person who deposits $6.03 per week until June will be delivered a car in that month. Those who deposit $7.13 per week will be delivered a car in May, while those who can pay $8.71 each week will be able to drive their new car in April. The buyer has the option of paying the money each week to the dealer or to the bank.

FORD DEALERS COOPERATE

Atlanta, Ga., Dec. 16—Ford dealers of the Atlanta territory are conducting an extensive cooperative advertising campaign, using the newspapers almost entirely, in a concerted effort to obtain extra holiday business. They have adopted the slogan, "The Ford is a sensible Christmas gift," and Ford salesmen are making a special effort to get Christmas business on the strength of this slogan. Results are proving unusually good.

OVERLAND DEALER RALLY

Portland, Ore., Dec. 16—Representatives of the Willys-Overland Company and Willys-Knight and Overland dealers of Oregon gathered at the local headquarters of the company during the past week for a sales rally and luncheon. Every section of the state was represented.

Hupp Dealers Pledge 100 Per Cent Increase in 1922

Chicago Organization Boosted 1921 Sales 60 Per Cent Over Those of 1920

CHICAGO, Dec. 17—When the Hupmobile dealers of the Chicago territory gathered for their semi-annual meeting under the leadership of C. E. Gambill, president of the Marmon-Chicago Co., Hupp distributor, they pledged themselves to sell 100 per cent more cars in 1922 than in 1921, in face of the fact that they had increased the 1920 sales 60 per cent in 1921. The speakers of the day were O. C. Hutchingson, sales manager of the Hupmobile Corp.; George Weber, Hupp Distributor in St. Louis; Clyde Jennings, managing editor of MOTOR AGE, and several dealers who had made exceptional records. Gambill, of course, made the chief talk, and he had his text printed on the large banner which hung back of the head table. This is the wording:

Our 1922 Motto

"2500 Hupmobiles"

What Does This Mean?

It Means

Carefull Analysis of Your Territory
- Secure the name of every car buyer in your territory
- Plan direct sales campaigns
- Advertise in your local papers
- Mail Hupmobile literature every week
- Call ten prospects on the telephone every day
- Your profits are in used cars
- Do not allow more than a used car is worth
- Used cars require as much sale efforts as new cars

Harder Work
- Make more calls every day
- Ask more prospects "To Buy"
- Double up on demonstrations
- Bring more people to your salesroom
- Keep your showroom dressed up
- Start an hour earlier and work an hour later

Satisfy the Owner
- Keep in close touch with owners
- Give them better service. (This does not mean free service)
- Carry a sufficient stock of parts
- Make every owner a booster
- A Hupmobile booster will sell one or two cars a year for you

OAKLAND GUARANTEE

Pontiac, Mich., Dec. 23—The Oakland Motor Car Co. has announced that it will guarantee the motors in its new 34D models against what is known as "oil pumping" for 15,000 miles or over a period not exceeding two years. This special written guarantee will be given by every Oakland dealer.

FIRESTONE LOSSES, $16,000,000

Akron, O., Dec. 20—H. S. Firestone, president, told stockholders of the Firestone Tire & Rubber Co. at their annual meeting that after taking a loss of $16,000,000 in inventories and tangible assets the company was entering the new year on a sound basis. The surplus now is $15,813,258.30, the report showed.

Sales for the year were reported as $86,372,938.54, a decrease of 42 per cent in dollars and 15 per cent in number of tires from last year. The decrease was in export and manufacturers' business, sales to dealers increasing two per cent. Selling expenses decreased 38 per cent and factory overhead 58 per cent.

Quarterly dividends on six and seven per cent preferred stock, Jan. 15 and Feb. 16, respectively, were declared.

PLACES PACKARDS ON TRIAL

Columbus, O., Dec. 17—The Packard-Columbus Co., central Ohio distributor for the Packard, has announced a new plan in selling Packards, principally the six-cylinder line. Selling on trial is the gist of the plan. The car is delivered to a family with the understanding that it is to be used a week on trial. It is believed that the trial will be so satisfactory that practically none will be returned.

AUTOCAR REDUCES PRICES

Ardmore, Pa., Dec. 16—The Autocar Co. has announced a reduction in prices on its standard truck, effective Jan. 3. The type F, with a 97-in. wheelbase, is reduced from $2300 to $1950, and type G, with a 120-in. wheelbase, from $2400 to $2050. The new 3-ton heavy duty truck with a 114-in. wheelbase is priced at $2950, and with a wheelbase of 138 in. at $3075. The new 5-ton heavy duty truck with a 120-in. wheelbase is listed at $3950, with a 156-in. wheelbase at $4100.

"Y" OPENS SERVICE SCHOOL

Jacksonville, Fla., Dec. 16—The local Y. M. C. A. has announced plans for the formation of classes for the study of automobile and motor operation, to start shortly after the first of the year.

CORRECTION

Through similarity in names, MOTOR AGE, in printing the price changes on the Romer car, a Boston product, made it appear that the changes were on the prices of the Roamer car, made by the Barley Motor Car Co., Kalamazoo, Mich. There is no connection between the two organizations.

Country-Wide Branches Is Plan of Gary Creditors

Company, Reorganized, Will Have $5,000,000 Capital and Will Build Commercial Wagon

CHICAGO, Dec. 19—Judge Carpenter, sitting in Federal court at Indianapolis, Saturday, appointed Charles Surprise, clerk of the Federal court at Hammond, Ind., custodian of the property of the Gary Motor Truck Co., succeeding G. M. Semmes, who was appointed receiver by the Superior court of Gary. Richard R. Schaff, president of the First National Bank of Gary, it is understood, will be appointed trustee within a few days.

At a recent meeting of the creditors of the company, a creditors' committee was appointed to look after the interests of the creditors and to work out a plan whereby the company's property may be kept out of forced sale. Seventy per cent of the creditors representing 90 per cent of the indebtedness of the company, have agreed to accept the judgment of this committee, which is composed of C. W. Dickinson, Timpkin-Detroit Axle Co.; Mr. Sloan, of the Buda Co.; K. F. Conrad, of Parrush & Bingham, and C. W. Fuller, of Fuller & Sons Mfg. Co.

Frank Dawson, president of the Gary Motor Truck Co., said in a statement to MOTOR AGE Monday that he has enough money to refinance the company, thus keeping it out of a receiver's hammer sale. His plan will mean that all the old stockholders will lose all their stock but that the creditors will be paid in full. In case of a forced sale it is said that the creditors will not realize more than 30 per cent.

If the reorganization planned by Dawson goes through, the new company will be capitalized for $5,000,000, will operate its own branches throughout the country and will build a business wagon in the speed class.

These Dealers Pledge Double Sales

Murphy Sets World's Record for 250 Miles at San Carlos

Wins Opening Race at New Speedway at Speed of 111.8 Miles Per Hour

SAN CARLOS SPEEDWAY, Calif., Dec. 16—Setting a new world's secord of 111.8 miles per hour for board speedways here Dec. 11, Jimmy Murphy, winner of the Grand Prix in France this year, won the 250-mile International Sweepstakes Race, which opened the mile and a quarter bowl of the Greater San Francisco Speedway.

Murphy is a San Francisco boy, and more than 40,000 persons saw him win the race. Murphy's time for the distance was 2:15:11 1/5. Tommy Milton came in second, in 2:16:57 2/5. Eddie Hearne finished third, in 2:19:18 3/5. Harry Hartz came fourth in 2:22:21 1/5, and Ralph DePalma was more than two minutes behind him, being fifth.

Murphy took the lead in the third lap and never was headed until the finish. Murphy drove a Duesenberg, Milton a Miller-Durant, Hearne a Duesenberg, Hartz a Duesenberg and DePalma his special Durant, so it was a Duesenberg day.

Prizes totaled $25,000. Other entries were Roscoe Sarles, driving a Duesenberg; Benny Hill, in a Frontenac; Jerry Wonderlich, in a Frontenac, and Al Melchnor, in a Thiele.

Milton, however, wins the speed crown for 1921 and $5000 from the American Automobile Assn. for making the best record for this racing season, Murphy being ineligible because of his having competed in Europe.

An Essex, with Crosby driving, took the 25-mile stock car race in 17 minutes 32 4/5 seconds, covering one lap in 50.5 seconds, at the rate of 89 m.p.h.

Officials were: referee, William T. Sesnon; A. A. A. representatives, E. R. Cheffins; starter, Lester, Manning; chief timer, E. H. Pendleton, and chairman of technical committee, Glover Ruckstell. Jack Prince built the track.

Hercules Corp. Preparing to Make Six-Cyl. McCurdy Car

Indianapolis, Dec. 16—Col. W. H. McCurdy, president of the Hercules Corp. of Evansville, Ind., today announced that his company, one of the largest industrial concerns in the mid west, would enter the motor car production field early in 1922 with the McCurdy, a six-cylinder car with standard parts and a wheelbase of about 126 in. It is not likely that the car will be ready for exhibit at the shows, but it is hoped to have it ready for the market in the spring.

The Hercules Corp., which will build the car without going outside its own organization to finance it, has long been known as one of the largest corporations in the line of the making of buggies and carriages, gasoline engines and bodies for trucks and commerical cars. Started 31 years ago in Cincinnati, the company has been located in Evansville for the last 20 years. Its factories cover 31 acres.

This company has spent nearly a year in preparation of the car, which is the development of a car designed by Gard Gale called the Gale, exhibited at the March Indianapolis show in 1920. Both Gale and Lynn McCurdy have been identified with the automobile industry for many years.

No Horses, So Town Would Sell Fountain

PHILADELPHIA, Dec. 9—Kennett Square wants to sell its ornamental fountain horse watering station, since virtually no horses are used in that town, motor cars having displaced them. With the proceeds of the sale of the fountain, the council would establish a nucleus for a world war memorial fund.

Missouri Names Devices to Pass New Light-Signal Law

Jefferson City, Mo., Dec. 20—In the Dec. 1 issue of MOTOR AGE there was published a list of those lenses and signaling devices that had been approved by the prosecuting attorney of St. Louis to be used on enclosed cars. The secretary of state's office, in compliance with the new law, which has been in effect since last November, has issued a list of devices up to all requirements of the law, which to date is as follows, additions being made as other devices meet the tests:

Door Glasses or Lenses

	Class	Maximum C.P.
Holophane	C	21
Warner	B	32
Osgood	C	21
Bausch & Lomb	C	21
T-K Bull's Eye	C	21
H. T. S.	A	36
Dillon Tyle 3	C	21
McKee Sunlight Type D	C	21
Patterson	C	21
Conaphore Type B Clear	C	21
Conaphore Type F Clear	C	21
Blue Wing	C	21
Shaler Road Light	C	21

Rear and Signalling Devices

Automatic Signal, D-Rex-U, Auto Indicator, Simmons Stop Signal, MacTurn Auto Signal Co. of St. Louis, Mo., Kabsy Semaphore Signal, Starlight Signal, Hysign Safety Traffic Signal, Meile Automatic Traffic Signal, S. C. K. Electrical Auto Signal, Tel-Nite Auto Signal, Higs Light Signal, All-Nay Signal, Protex Signal, Thuallen, Turn-O-Stop, Stop Signal, Interstate Auto Signal, Roedding Signal, Globe Rear Stop Signal, Buff Vehicle Semaphore, M-1 Standard Stop Light, Bradley Universal Signal, Southern Day & Night Auto Signal.

EARL DELIVERY WAGON

Detroit, Dec. 16—Earl Motors, Inc., has brought out a light delivery car in screen and panel sides, the screen selling for $1085 and the panel for $1160. The chassis specifications correspond closely to the passenger car line, having 109-inch wheelbase, 31 by 4 cord tires, and weighing about 2500 lbs.

N.M.V.C.C. Opposes Overloads As Allowed in Connecticut

State Winks at Law When Trucks' Capacities Are Guaranteed by Manufacturers

HARTFORD, Conn., Dec. 15—Representatives of the National Motor Vehicle Conference Committee conferred here Dec. 12 with Motor Vehicle Commissioner Stoeckl on the state law designed to prevent the overloading of motor trucks. It was made clear to them that the state officials would cooperate to the fullest extent with the automotive industry in its efforts to wipe out the overloading evil.

The conference was the direct result of the ruling by the Connecticut authorities that trucks will be permitted to carry more than their rated load whenever their makers will certify that their operation will be entirely safe with the heavier load. This ruling was made at the earnest request of truck operators, but it is opposed by the National Motor Vehicle Conference Committee, which was represented at the conference by D. C. Fenner, its chairman, and F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce. They do not believe trucks should carry more than their rated load.

It was explained by Stoeckl that if a manufacturer gave formal notice that a 3½-ton truck could safely carry a 5-ton load the vehicle would be re-rated as of a 5-ton capacity and would be taxed accordingly.

The Connecticut authorities contend that not only do overloaded trucks seriously damage state highways, but also that they are a prolific cause of traffic accidents. It is asserted that the number of highway mishaps has decreased appreciably since rigid regulations against overloading were adopted.

Hartford Service Stations to Clean House by Jan. 1

Hartford, Conn., Dec. 16—At a meeting here of the Automotive Service Assn. of Hartford county, A. M. Reeves, manager of the Hartford branch of the Gill Piston Ring Co., gave his impressions on service as it is obtainable in Hartford garages, and emphasized the fact that of all the garages in this city not over a dozen are clean, the balance being classed as filthy.

The meeting followed a dinner and developed into an all around discussion of the most urgent needs of service station operators at this time. It was brought out that the various operators did not know as much about their own business as they ought to know and a plan of education was suggested as a means of building up business. The members agreed that the balance of the month should be devoted to cleaning up their places.

Credit Associations Find Duplicate Loans Are Common

National and Local Companies Planning Active Legislative Program With Dealer Interest

CHICAGO, Dec. 16—The Central Auto Finance Credit Assn., which is composed of 16 Chicago organizations and one out-of-town firm, was the host to a dozen or more out-of-town firms at the regular monthly dinner last night at the Union League Club. Guests were present from several Michigan, Indiana and Illinois towns, as well as a representative of the recently organized St. Louis association. The object of the guest dinner was to advance the idea of the national association, which was organized at Cleveland some months ago.

It developed during the discussion, much of which was informal, that the actual benefit from the local and national associations had been great and very direct. By the reporting of the serial and other numbers of each car on which a loan is made, a stop-loss method has been devised that not only exposes fraud attempts, but is a reliable and accurate check on the carelessness in making out the mortgages and other papers.

It was freely asserted at the meeting that in recent investigations, made possible by the cooperation of a large number of the finance companies, 60 per cent of the cars sold are sold on payments. The speakers were careful to make it clear that this is not 60 per cent of the dollar volume of the business, but by a car count. It was predicted that owing to the trouble banks are having with such accounts, eventually practically all of this paper would be handled by the finance companies. The present organization effort is to put the well conducted automotive paper dealer establishments on their proper plane and to eliminate those which are not doing business in the proper manner. This will be accomplished, the association members believe, through a lessened cost of doing business when fraud is eliminated. It is a little known fact that duplicate loans are a common and ever-present evil.

Walter E. Heller, president of the Chicago association, presided at this meeting, and Fred E. Barrett, of Indianapolis, was the chief speaker. Barrett only last week assisted in organizing the St. Louis section and recently assisted in the organization of the Pittsburgh section. All of these sections are filing their information with the national association in New York.

The national and several local associations are planning an active legislative program. They expect to work in line with dealer and other associations, as they believe that the interests are in common. One of the laws that this organization is interested in promoting is the requirement that an automotive vehicle be provided with an abstract of title. The leaders say that where this plan is in operation thefts are on the decrease, as theft cannot thrive where the market is removed; but only by all states adopting this plan will the real benefit become apparent. Clyde Jennings, managing editor of MOTOR AGE, talked on the present situation among dealers.

Fire Damages Templar Plant to Extent of Nearly $300,000

Cleveland, Dec. 16—Fire that swept the Templar Motors Co. property at Halstead and Plover avenues, Lakewood, for three hours Dec. 13, destroyed property valued roughly by M. F. Bramley, head of the Templar concern, at between $250,000 and $300,000.

The main fireproof plant of the Templar property was the only structure that remained untouched by fire. The old main plant, a frame structure composed of three buildings, which was built four years ago and in which the parts used for building cars were stored, was completely burned, including about 30 automobiles. President Bramley reported that all the electrical fixtures and automobile supplies used by the company had been destroyed.

Besides this, he said, about 300 new windshields were lost. He estimated that there was about $75,000 worth of service stock alone stored in the building. The cause of the fire is unknown. President Bramley announced that work will go on as usual.

ATLANTA DEALERS POOL TRADE-INS

Savannah, Ga., Dec. 16—Members of the Savannah Automobile Dealers' Assn. cooperated in a used car exhibition and sale held at the Savannah auditorium, Dec. 8 to 14, highly successful results being obtained in the matter of sales. Nearly 100 used cars were on display, the selection of the best stock of the various members of the association, and by a concerted effort on the part of salesmen during the progress of the show far better results were obtained than even the most optimistic dealers had hoped for.

The dealers had arranged a special selling plan in vogue only during the progress of the sale, which permitted the purchaser to drive the car for three days, and then to exchange it at the end of that time for any other car in the stock of the dealer making the original sale if, for any reason, the purchaser was dissatisfied.

TIRE INDUSTRY CUTTING COSTS

Akron, Dec. 16—The tire industry has turned to selling costs as the next problem to be solved in bringing the industry a rock bottom basis. Much has already been done in the way of closing expensive branches in the high rent districts in large cities, but the cost of distributing the products remains as high as 30 per cent in some instances.

Overload Is Not Common to Trucks on Oregon Highways

State Traffic Officers Find Abuse of Law in This Respect to Be Rare

PORTLAND, Ore., Dec. 16—That drivers of for-hire motor trucks are not the offenders against state traffic laws to the extent that is generally claimed, and that the drivers are living within the requirements of the law both as to weight of load and speed and therefore are not damaging the highways to the extent that is charged in many quarters, seemed conclusively proved this week, when the state traffic officer, T. A. Rafferty, made public a report showing the activities of his department with loadometers during the months of August, September and October, this year. The motor truck is coming in for more than its share of criticism throughout the entire Pacific northwest at this time, it being claimed by opponents to the truck that trucks are breaking up the roads by overloads and excessive speed.

Loadometers were first put in the hands of the state traffic officers late in July, according to the report, and during August, the first month of operation with this new truck weighing device, a total of 422 trucks were stopped by the officers and of this number 236 were considered subject for investigation and were weighed. But 29 were found to be overloaded to any degree, and of this number but five had overloads of more than one ton. In over a fourth of the cases the load could have been shifted slightly and made to conform to the law.

During September 611 trucks were inspected and of this number 192 were weighed. A total of 34 were found overloaded, but the overload in this case averaged but 750 lbs. per truck, a considerable reduction over the month previous. In October 164 trucks were weighed and 30 reported overloaded.

In view of the fact that hundreds of motor trucks were constantly plying on the highways during those periods, which were so obviously not overloaded as not to be subjected to investigation by the officers, it is considered that the report is highly satisfactory and goes a long way towards proving that the truck is not the violator of state law and the destroyer of highways that is claimed.

MOLINE PLAN OPERATIVE

Chicago, Dec. 18—The reorganization plan of the Moline Plow Co. is operative and virtually all the merchandise and bank creditors have assented to the plan, and about 88 per cent, or $3,500,000 of the $4,000,000 serial notes have been deposited with the committee. The time for the deposit of notes was to have expired Dec. 12, but is now extended until further notice so that all note holders may have a chance to come in on the new plan.

In the Retail Field

Haury Motor Co., Louisville, will erect a new one-story brick garage and salesroom. This concern has just been appointed distributor for the new Durant car in this territory. The company also handles the Scripps-Booth car.

Auburn Sales Co., Cleveland distributor of the Auburn Six, has moved into its new building for sales and service. A used car salesroom has been provided on the second floor.

N. Bos has been named dealer for Chevrolet cars in Kalamazoo, Mich.

Earl Philadelphia Motor Car Co. has been appointed distributor in the Philadelphia district for Earl motor cars. John C. Baggott is president; R. C. McCormick, vice president, and John R. Thomas, secretary and treasurer.

William H. Nichols Co., South Bend, Ind., has been incorporated for $100,000, taking out a charter for the manufacture and sale of automobiles, parts, etc. Nichols is the Buick agent in St. Joseph county.

C. H. Wills & Co., Marysville, Mich., announces the appointment of five new distributors and 30 new dealers. The new distributors are: C. A. Houck, Inc., Albany, N. Y.; United Motors Corp., Louisville, Ky.; Western Motor Car Co., Omaha, Neb.; H. E. Willingham Co., Inc., Richmond, Va.; Burwell-Harris Co., Charlotte, N. C.

Phelps-Smith Co., Huron, S. D., has taken over the factory distributorship of Firestone products, formerly held by the Gilreath Co.

Lexington Motor Co., of Philadelphia, Pa., of which W. A. Kuser is president, has signed with the Gardner Motor Co., of St. Louis, for the distribution of its cars in eastern Pennsylvania, southern New Jersey, Delaware and eastern Maryland.

Renners' Auto Rebuild plant has been purchased by Herbert A. Munter and H. A. Pratt. Munter is a well known commercial aviator and Pratt is a former automobile salesman.

James G. Barclay, automobile supply dealer of Buffalo, has purchased the Weyand brewery property at a cost of $250,000, and will remodel it into a sales and service station.

F. L. Roberts Co. has opened an automotive equipment, tire, accessory and sporting goods store at Springfield, Mass. Associated with him is Ernest Sarazin, formerly of the Mutual Tire & Rubber Co.

Charles F. Minott will soon open a new sales place for the Waltham car, with service station in connection, in a building now approaching completion in Greenfield, Mass.

W. E. Benson & Co., agent for the King car, will soon occupy a new sales and service building in Greenfield, Mass.

Herman L. Wood has bought of George F. Parsons his interest in the Mansion House garage, hitherto run by Parsons & Wood, in Greenfield, Mass.

Hassler Wisconsin Co., Milwaukee, has been organized to take over the distribution of Hassler shock absorbers in the Wisconsin and Upper Michigan territory, formerly handled through W. Frank Horn, Inc., Milwaukee.

Elmer Smith Ignition Co., Fond du Lac, Wis., has been incorporated with $30,000 capital to act as wholesale and retail dealer in ignition devices and to service and repair such apparatus.

Paradox Battery Mfg. & Service Co., Milwaukee, is a new $5,000 corporation organized by Gus. J. Guse, W. A. Wills and A. L. Trechsel, to manufacture, wholesale and retail, and repair storage batteries.

Breitenstein-Tozier Co., Stevens Point, Wis., has been appointed dealer in International trucks in Wood county and immediate vicinity. It will build a new sales and service building to supplant its present quarters.

R. H. Thieman Co., Sheboygan, Wis., Ford dealer, has taken over the large garage and service building recently vacated by the Raab Motor Co., now Ford dealer in Milwaukee, and will use it as the principal sales and auxiliary service headquarters to relieve the congestion of its main garage.

Jannsen & Zittlow, DePere, Wis., have sold their garage and repairshop business to Otto Koenig and Lucian Clark, who will continue as Koenig & Clark.

T. H. Sharp, Jr. has made arrangement with the Paige Motor Co. of Detroit, whereby his firm, the T. H. Sharp, Jr., Inc., becomes the state distributor for the Paige line of cars and trucks in Little Rock, Ark.

Edward De Mooy, former manager of the Fairbanks-Morse & Co. branch in Cleveland, has been named manager of the Cleveland Motor Car Sales Co. In his new capacity De Mooy will have charge of the distribution of the Haynes car in the Cleveland district.

Grieb & Thomas, Philadelpnia, has announced that the firm has given up handling the Briscoe line and will continue selling the Kissel car. H. E. Guthrie has been appointed wholesale manager. Frank H. Edwards will continue as retail manager.

Lemke & Hesselink, Cedar Grove, Wis., have been granted a Ford franchise and will enlarge their garage and service building to provide increased display, sales and service facilities.

English Bros. & Hardin has been organized and will occupy a new garage just completed at Danville, Ill.

Blackhawk Motor Co., Madison, Wis., is a new $20,000 corporation formed to deal in and service new and used motor cars, etc.

Hamernick Motor Car Co., Fond du Lac, Wis., has leased the present Nash garage and will take possession March 1, at which time H. E. Dunham, proprietor of the Nash Garage, will enter a new location.

A. P. Nelson Co., Inc., Green Bay, Wis., has been incorporated with $27,500 capital to deal in and repair motor cars, trucks, tractors, automotive equipment, accessories, etc.

Weyauwega (Wis.) Auto Co., owned by O. A. Richter, will build a one-story garage and service shop, 60 by 120 ft., early in the spring.

Frank Welsow, Big Suamico, Wis., has purchased the Riverside Garage from Earl C. DeVroy, and will remodel the building, install some new service equipment and provide display rooms with the intention of taking on one or more lines of cars and trucks.

Chippewa Battery & Electric Co., Chippewa Falls, Wis., moved Dec. 1 into larger quarters at Bay and Columbia streets. It is distributor of the Exide battery and does general service work on batteries, electrical apparatus, etc.

Peter Eernisse & Co., Hingham, Sheboygan county, Wisconsin, will build a garage and repairshop, 30 by 100 ft., and will deal in and service passenger and commercial cars, tractors, farm lighting systems, etc.

West End Garage Co., Appleton, Wis., has plans for a new sales and service building, 45 by 120 ft., to be ready Jan. 1.

Peoria, Ill., Implement Co. has been organized and will distribute tractors and other power farming machinery.

Constant & Groves, Springfield, Ill., has been organized to market the Franklin car in the Sangamon county territory.

McMillan Brothers, Willamina, Ore., have just completed their new garage building, which will be occupied by George & George automobile shop.

Chadick, DeLamater Corp., authorized distributor for Continental Motors parts, has signed a contract with the Warner Gear Co., of Muncie, Ind., to represent it for service parts in the New York territory.

T. H. Sharp, Jr., has been appointed Paige distributor for Arkansas, with headquarters at Little Rock. The company also handles the Oldsmobile.

Uhri & Carpenter, of the Toledo (Wash.) Garage & Land Co., have purchased the garage formerly owned by Hanson & Metzer at Vader, Wash.

Butte Auto Garage Co. and Butte Automobile Co., Nash distributor for Butte territory in Montana, have been sold and are now operated under the name of Butte Automobile Co.

Taber Redgers, Inc., Hartford, Conn., Durant distributor in Hartford, Tolland, Litchfield, Windham and New London and four townships in Rhode Island, has appointed the following sub-dealers: South Manchester, Ernest A. Bantly; New Britain, A. G. Hawker; Jewett City, Gilbert Auto Co.; Torrington, A. B. Wellman; New London, Silas Maxson, Jr.; Norwich, the A. F. Greene Co. The plans of the Hartford distributors call for 20 sub-dealers.

R. M. Thompson, Decatur, Ill., has been appointed distributor for the Packard car in the Macon county territory. Seven years ago the agency there was abandoned and the distribution arranged through the Chicago branch. Under a new policy, there are distributing points in a number of the important cities of central Illinois, including Bloomington.

Walter E. Flanders, chairman of the board of directors of the Rickenbacker Motor Co., will take over and operate Rickenbacker distribution franchises for the states of Maryland, Virginia, and the District of Columbia.

Marshall Motor Sales Co. has been organized and has opened a sales agency at Springfield, Ill. The Case car will be distributed in the Sangamon county territory and a repair and storage departments will be conducted. There will also be an accessory department.

Exclusive Representation Idea Back of New Models

Manufacturers Who Will Hold Live Dealerships Are Rounding Out Their Lines

DETROIT, Dec. 18—Insistence on exclusive representation by many of the leading companies of the industry is mainly responsible for many of the new models slated for introduction at the national shows. Makers who have been known for years as the manufacturers of heavy and medium-priced cars, are bringing out light and lower-priced cars intended to round out their lines and give their dealers complete lines from the one company.

Some of the older companies, Dodge notably, came out some time ago for exclusive representation on the part of its dealers, and has carried its point. In the general strengthening of sales organizations for the competition of 1922, the theory of exclusiveness has been adopted by many more manufacturers and considerable of a battle has developed to retain the substantial dealerships.

Few manufacturers are carrying through on the one-model basis. Ford, Dodge and Lincoln are notable in this class, as are Hupp, Reo, Dort and Saxon. Rickenbacker Motors is starting out in the one-price class.

General Motors, with its line of Chevrolet, Oakland, Buick, Oldsmobile and Cadillac, contains a varied assortment of models and prices, Buick, Oldsmobile and Chevrolet having two or more models and price classes alone. Nash and Studebaker have lines corresponding closely to the Buick and Oldsmobile assortment, embracing fours, sixes and big sixes.

Others in the four and six field in the Detroit district, but operating as separate entities, are Hudson-Essex and Maxwell-Chalmers. Chandler-Cleveland has been operating in the big six and little six field, as has Columbia, and to this field is now being added Paige-Jewett, Hanson and perhaps Liberty.

The movement to bring about exclusive representation of companies has been proceeding quietly, but nevertheless it has been proceeding, and 1922 will see more progress in this direction than the industry has known before. The theory in back of the movement is that cars are being bought today mainly on a dealer personality basis, and an owner switching to a higher-priced vehicle will buy from the dealer who sold him a satisfactory low-priced car.

STUDEBAKER TACKLES TRADE-INS

South Bend, Ind., Dec. 12—The Studebaker Corp. sales department for the next several months is going to center its attention on the used car problem. H. B. Harper, sales manager, has added to his staff a man who will devote his time for some months to a study of this problem and a possible solution.

Business Notes

Guaranteed Storage Batteries, Ltd., Vancouver, B. C., manufacturing electrical storage batteries, incorporated for $50,000.

Overland-Angelica Motor Car Co., of Angelica, N. Y., has been incorporated for $10,000 to do a general automobile business, by Edward J. Atherton and others of Angelica.

Grand Rapids Tire & Rubber Corp. has increased its capital stock to $3,000,000.

Ragner A. Roscoe has filed suit in the Jackson county, Missouri, circuit court, asking receiver for the U. S. Products Co., of which he is president. The company has headquarters in Kansas City.

Alemite Products Co., Ltd., Belleville, Ont., will shortly begin the manufacture of Alemite products for the Canadian trade. The Alemite Products Co., Ltd., is a subsidiary of the Bassick Mfg. Co., which successfully pioneered the Alemite system of lubrication.

Jacobsen Mfg. Co., of Racine, Wis., has recently increased its capital stock from $60,000 to $100,000, and on Jan. 1 will increase its operating force from 90 to 100 per cent.

American Hide & Leather Co. expects to start work Jan. 1 on the construction of a new tanning plant at Milwaukee to replace the plant destroyed by fire in October, with a loss of $1,345,000.

Instant Heat Co. of America has been incorporated at Appleton, Wis., with a capital stock of $25,000, by A. H. Krugmeier, L. Richardson and H. H. Pelkey, representing a group which recently purchased the property of the defunct Instant Wonder Heat Co., Appleton.

Chain Belt Co., Milwaukee, which has been operating its gray iron foundry three days a week with reduced forces nearly all of this year, on Dec. 1 returned to a six-day weekly schedule and increased its force to a number equivalent to the largest staff it has ever employed.

United States Radiator Corp., of Detroit, a $4,000,000 Michigan corporation, has filed articles and been granted a local charter in Wisconsin. Offices will be established in Milwaukee.

American Metal Parts Co., Milwaukee, specializing in automotive parts and equipment, has recently increased its capitalization from $100,000 to $200,000. H. A. Sherff is president, and S. A. Fulton, vice president and general manager.

A. O. Smith Corp., Milwaukee, one of the largest manufacturers in this country of pressed, forged and stamped automotive parts and equipment, is engaging in quantity production of a pressed steel running board designed for replacements on cars having the ordinary wooden board, as well as for new designs of cars.

Victor Krefl Mfg. Co., formerly of Two Rivers, Wis., has completed its new factory at Eagle River, Wis., and is again in quantity production on shock absorbers and other metal automotive specialties.

E. L. M. Tire Co., of Racine, Wis., has tentative plans for its proposed new factory, to be erected during 1922. It will be 150 by 160 ft., two stories, and with equipment will cost about $200,000.

Huntington Automotive Co., Fort Wayne, Ind., has been formed to take over the Borland Piston Works, of Hunting, Ind. The new concern will manufacture automobile parts and accessories. The company has a capital stock of $100,000.

Allen Tire & Rubber Co., Allentown, Pa., plans to set a new mark for production before the end of the year. Business representing $2,000,000 has been obtained in the last few weeks.

Aurora, Ill., Automotive Products Co. has been organized. The company is composed of E. F. Fagen, M. W. Cudding and V. C. Winkenweder. Capital stock has been fixed at $50,000 and articles of incorporation issued. The company makes a line of accessories and certain replacement parts.

Automotive Products Co., Aurora, Ill., has been organized for the purpose of manufacturing motor vehicle accessories. The promoters are V. C. Winkenwedder, president and general manager of the Mor-Air Pump Co.; H. W. Cudding, for seven years auditor of the Lyon Metallic Co., and E. F. Fagan, superintendent of the Allsteelequip Co.

O. S. & R. Mfg. Co., Seattle, $500,000, has been incorporated by Bert C. Ross to prepare for market, automobiles, accessories, etc.

National Body Mfg. Co., manufacturers of bodies for Fords, a recently bankrupted corporation of Nashville, Tenn., has been purchased in the bankrupt court by a group of Nashville business men. The plant is already in operation and the new management is very optimistic over the prospects for business in the early spring.

Herschede Motor Car Co., Cincinnati, O., has been chartered with a capital of $100,000, to do a general retail business in automobiles and accessories.

Diamond Holfast Rubber Co.'s new tire factory, being constructed in Atlanta, will be completed and ready for operation by Jan. 1, 1922, officials of the company announce.

Graham Brothers, with plants at Detroit and Evansville, Ind., are marketing all 1 and 1½-ton trucks through the Dodge Brothers sales organization.

Templar to Have New Sport Model at Cleveland Show

Cleveland, Dec. 16—The Templar Motor Car Co. of this city will bring out a new DeLuxe four-passenger sport model. The new model will be shown at the 1922 automobile show, to be held in this city the week starting Jan. 22. The trial tests have satisfied the designers, and manufacture is under way.

The new car will sell for slightly more money than the models of the company that are now on the market, and the price will be around $2800. It is an open car.

There will be a nickel radiator, drum lamps, polished deck rails and polished engine, special fenders, and the parts will be in black enamel; solid aluminum steps will be provided. Two spare wheels and tires will be provided with each car, and they will be mounted near the front fender. A trunk rack, in which will be placed a special and attractive automobile trunk with metal straps, will be another feature. The curtains will be carried under the arm rest in the rear seat.

The car will come in the standard color, blue, blue wine and Twyman gray. The model will be equipped with a Templar four-cylinder engine, 3⅝ by 5½.

K. C. SPEEDWAY ASSOCIATION

Kansas City, Mo., Dec. 16—The Kansas City Speedway Assn. has permanently organized and is proceeding with its program for erecting the wooden speedway on a 192-acre tract 10 miles south of Kansas City. John A. Butler, president of the Butler Motor Co., Dodge distributor, was elected president; H. E. Sloan, vice-president, and E. E. Peake, secretary and manager. The treasurer is a Kansas City banker, W. P. Hemphill. It is planned to have the speedway ready for races in May or June, at dates adjusted to those already set for eastern and western events.

G.M.C. TO DRAFT SALES CODE

Detroit, Dec. 16—A code of practice governing the exhibition and sale of General Motors Corp. cars at the national shows and the local shows of 1922 will be drafted by the advisory board of the corporation following a meeting of sales executives of all units this week.

In the exchange of experiences valuable suggestions on the arrangement of exhibits, presentation of cars and selling help were received.

Manufacturers' Sales Tax Is Still Alive in Congress

Secretary Mellon Favors It and Senator Smoot Says It Is Sure to Follow

WASHINGTON, Dec. 16—Indications that the administration is preparing to swing its support to a manufacturers' sales tax is found in the annual report of A. W. Mellon, secretary of the treasury, in which he outlines his views on revenue reforms for the next fiscal year.

In discussing recommendations for a reduction in the surtax rates, Mellon says:

"If this loss of revenue could not be met by rigid economy in expenditure, the revenue required could be raised either by placing a tax on certain specific articles, or by a low-rate general tax on a broad class of articles or transactions. Such taxes as those now imposed on automobiles and tires have been found simple and inexpensive of administration and the collection is always substantially current; they have been steady producers of revenue and have been without injurious effect upon the country. In view of past experiences, a general tax either of this or like character upon a broad class of articles or transactions could be readily administered, and the rate could be made sufficiently low as not to bear unduly upon any class and at the same time produce a large amount of additional revenue."

If this proposal is adopted, it probably will mean the elimination of the obnoxious excise taxes which the automotive industry now is paying while almost all other important industries have been exempted.

Senator Smoot, who is the foremost advocate of the sales tax, told MOTOR AGE that until he had read Secretary Mellon's report carefully he would not venture an opinion on it. He added positively, however, that "a sales tax is coming."

"I wouldn't go so far as to say that it would come at the present session, but, once adopted, I know it never will be dropped."

Senator Smoot said the manufacturers' sales tax was the form most easily applied and that it would be as good as any. He doesn't believe the revenue-raising possibilities of a sales tax should be applied for a soldiers' bonus, but that when a bonus plan is adopted, as it undoubtedly will be at this session, a specific appropriation should be made by Congress to provide for it.

OAKLAND SHOW SUCCESS ASSURED

Oakland, Calif., Dec. 16—The Oakland Automobile Show, to be held in the Municipal Auditorium Jan. 16 to 22, has requests for 10,000 sq. ft. of floor space more than can be furnished, according to Robert W. Martland, who is directing the show as general manager.

Concerning Men You Know

W. M. Green, New York branch manager and eastern representative of the Wire Wheel Corp., has resigned to become manager of sales for the Thompson Lattice Wheel Corp., incorporated for $100,000, in New York.

G. V. Orr has been made manager of the Indianapolis Willys-Overland, Inc., branch, recently taken over from Gibson Co. Mr. Orr comes from Waterloo, Ia., where he was secretary and general manager of the Overland Waterloo Co.

Robert G. Ewell, formerly general manager of sales and advertising for the Allen Motor Car Co., Columbus, O., has become assistant sales manager of the Auburn Automobile Co., Auburn, Ind., and will share in the work of Charles H. Strieby, also assistant sales manager. Ewell will look after merchandising and advertising.

Joseph H. Alfred has been appointed as assistant to A. C. Barber, sales manager of the Willys-Overland Co. Alfred is well known in the automobile business, having for the past two years been assistant to W. E. Tigges, comptroller of the Willys-Overland Co.

Gordon Cameron, formerly with the Maxwell organization, has been appointed director of service of the Republic Truck Sales Corp., and will have complete charge of servicing all trucks from the factory.

Percy E. Chamberlain delivered four lectures on automobile selling and service to members of the Springfield, Mass., Automotive Dealers' Assn., at the Chamber of Commerce the week of Nov. 28, and much interest was evinced in the topics under discussion.

George H. Layng, formerly with the Cadillac organization, has been made vice president and manager of Peerless.

C. H. McGirr has been named president of the Portland Automotive Trades Assn.; Don Bates, first vice president; L. L. Blumenthal, second vice president; H. B. Black, third vice president; Guy Spencer, secretary; F. H. Hilderbrand, treasurer.

Benjamin F. Ulmer, assistant manager of the Atlanta Buick branch, has again been named publicity manager for the Great Southern Automobile Show, to be held at the Atlanta Auditorium Feb. 11 to 18.

H. B. Thackston has been appointed manager of the Atlanta branch for the B. F. Goodrich Rubber Co., succeeding L. H. Diehl, who has been transferred to the Charlotte, N. C., branch as manager.

L. M. Bradley, former manager of the M. A. M. A., has joined the sales force of the C. G. Spring Co., Kalamazoo, Mich.

L. C. Alexander has been appointed Western Ohio manager with headquarters at Columbus for the Eclipse Mfg. Co., Indianapolis, manufacturer of Hercules spark plugs.

James F. Wright, for several years manager of the Middletown, Conn., branch of the Elmer Automobile Co., Hartford, Conn., and Ford distributor in northern Connecticut, has joined the sales forces of the new Bennett Hartford Co.

I. R. Bailey, formerly with Goodyear, is Seiberling's new sales manager, and H. L. Post is assistant. W. A. Golden will be branch manager at Boston; Wade Aydelotte, at New York; J. E. Vail, at Philadelphia; H. E. Langdon, at St. Louis; L. G. Gates, at Chicago; J. L. Cochrun, at Detroit; W. H. Ector, at Dallas; R. L. Richie, at Kansas City; W. F. Ong, at Cincinnati; J. E. Argus, at Los Angeles; W. I. Walters, at Atlanta; W. T. Stanley, at Minneapolis, and C. C. Jones, at Akron.

$2 Coupons Draw Owners to Service Station's New Door

Macon, Ga., Dec. 17—The Adams-Buchanan Motor Co. of this city, authorized Ford and Fordson dealers, during the early part of December employed an unusual method of calling attention to a change of location of its service station and mechanical departments.

Advertising its change of location in the Macon newspapers, the company announced that it would give $600 worth of service and mechanical work absolutely free to Ford owners of Macon and vicinity. There were no strings of any kind to the offer. Coupons had been issued worth $2 each in service or mechanical work of any kind, and the plan was to distribute 300 of these coupons free to the first 300 Ford owners who would drive their cars to the new service station. The coupons were quickly disposed of. This plan enabled the Adams-Buchanan Motor Co. to call attention of Ford owners to the fact that it had moved its service station and mechanical department, impressing the new location upon coupon holders' mind.

BARCO CHANGES DISTRIBUTION

Detroit, Dec. 16—Barco Battery Co. has made a complete change in its distribution methods and will in the future handle its sales through permanent district managers who replace the former factory sales representatives. The following district managers have been appointed:

Alvan W. Dodge, Connecticut, with offices in Hartford, formerly assistant sales manager Chevrolet Motor Co. of Connecticut; George R. Flinn, New England except Connecticut, offices Worcester, Mass., formerly with B. F. Goodrich Rubber Co.; Pierson R. Cummings, New York State, offices New York City, formerly with Baker R & L Co.; C. W. Russell, New Jersey, offices Newark, formerly with National Scale Co.; Harold W. Harwell, Pennsylvania, offices Philadelphia, formerly with Henderson Tire Co.; Saunders & Wetmore, Ohio, offices Cleveland, Wetmore formerly being with Carbon Seal Co., Pittsburgh.

PREDICTS FEWER TIRE COMPANIES

Cleveland, Dec. 16—D. M. Mason, treasurer and general manager of the Mason Tire & Rubber Co., of Kent., predicts that the tire industry is headed directly toward the prewar levels.

"The house cleaning in industry," he says, "has cut the overhead, the departmental expenses, statistical divisions and experimental and research branches of the industry. The result has been the bringing of costs to undreamed of low levels. The inevitable aftermath of this reduction will be a wholesale elimination of the smaller tire companies. There were some 200 of these at the peak, while before the war there were only 25 brands of tires on the market. It is my prediction that the time is not far off when the industry will be back to prewar basis in numbers."

DIEHL A LICENSE MAKER

Buffalo, Dec. 18—George C. Diehl, president of the American Automobile Assn., is vice-president and one of the incorporators of the Porcelized Metal Corp., organized here with a capital of $150,000 to manufacture automobile license plates.

Improved Road Maintenance Costs Determined in Oregon

Pavement Upkeep Is $3000 Per Mile, Macadam $1675, Says Highway Engineer

PORTLAND, Ore., Dec. 16—Interesting figures relative to cost of maintenance of highways in the State of Oregon were given out here by Herbert Nunn, state highway engineer, who recently completed an exhaustive study into the subject to secure data upon which to base a law regulating for-hire trucks and motor buses operating on public roads. A special session of the Oregon state legislature has been called for early in the coming year to pass a law relative to for-hire truck and bus operation, and the subject is now demanding the keen interest of automobile and truck men throughout the entire state.

Cost to the public of Oregon for maintaining one mile of pavement for one year is $3000, while the cost of maintaining a mile of macadam is $1675, according to Nunn's report. The cost for each vehicle-mile is given as .01 cent for pavement and .015 cent for macadam. For trucks each ton-mile on pavement costs the public .01 cent, and on macadam .015 cent. The cost per passenger-mile is figured at .002 cent.

The figures take into consideration all kinds of depreciation, not only to the pavement itself, but to the grades, cuts, fills, drainage and interest charges on road bonds.

What the new regulations governing for-hire trucks and buses will be cannot yet be foretold, but it is said the truck men offer no objection to the present regulation limiting the total load to 22,000 lbs., nor to the present speed regulations. A system of insurance for passengers and for granting licenses to bus lines on the basis of continuous and satisfactory service, eliminating the fly-by-night driver, are considered sure of incorporation in the new law.

STANDARD PARTS SELLING PLANTS

Cleveland, Dec. 19—A part of the economy program of the Standard Parts Co. is the sale of certain plants, a series of consolidations, rearrangements of plants and changes in the methods of handling materials.

Some time ago a small establishment 2½ miles distant from the main plant of the Bock Bearing Co., at Toledo, was sold. This gave rise to the report that the Bock Bearing plant, a unit of Standard Parts, had changed hands, but this was denied at general offices of Standard Parts here. The American Ball Bearing Axle plant, this city, is for sale; while the forge plant at Canton has been sold, and the plant of the spring company at Canton is on the market. The Hess-Carphage axle plant at Cincinnati also is for sale.

The Readers' Clearing House

Questions & Answers on Dealers' Problems

CAR CONFISCATED UNDER PROHIBITION ACT

Q—I remember reading in an issue of your magazine an article relative to the law in the confiscation of cars which had been bought on a partial payment plan from the purchasers who were using them in the illicit transportation of liquor. It seems to me that the article made particular mention of a Supreme Court ruling in some state on this matter covering a specific case.

I have a case of this kind on hand now, having sold the car "on time" myself, it not belonging to McArthur Bros., my employers. I did not take the precaution of taking out confiscation insurance. The car has now been taken over by the county with the intention of confiscating it. A hearing will be held on Dec. 5. In the preliminary hearing the judge mentioned that the decision of Supreme Courts in other states would probably have weight in the decision as to my equity in the car.

Have you any data which you could furnish me, especially as to decisions of Supreme Courts in various states? If so, I would appreciate it very much.—B. F. Whiting, Yuma, Ariz.

In an Alabama case, Bowling vs. State, 85 Southern 500, the Supreme Court then held that where the claimant of an automobile, which was sought to be sold by the state for its use in the transportation of prohibited liquors, shows, not only that he holds a valid subsisting mortgage on the car, but that he had no notice of its unlawful use, the car must be sold by the sheriff subject to the lien of claimant. Other Alabama cases holding thus are: Wise vs. State, 85 Southern 266; One Buick Automobile vs. State, 85 Southern 739; and Flint Motor Car Co. vs. State, 85 Southern 741.

The Oklahoma Supreme Court has held similarly under the Oklahoma statute. See Peavler vs. State, 193 Pacific 623, and in an Idaho case, Naylor vs. Simmons, 194 Pacific 94, that court held that, under the Idaho laws on forfeiture, the unlawful use of an automobile without the knowledge of its owner to transport intoxicating liquor does not forfeit his right to claim and recover possession of it nor render it subject to confiscation.

In all these cases before a forfeiture can be taken as against an owner or mortgagee it must be shown that the automobile, used in illegally transporting intoxicating liquors, was so used with the knowledge or consent of such owner or lien claimant. A Georgia case is Matson vs. Healey, 103 S. E. 37.

There is a discordant note in the rulings of the Supreme Court of Kansas in the case of State vs. Peterson, 193 Pac. 342, which is due to difference in the laws of that state.

Again in the United States District Court at St. Louis, a case arose under the Volstead Act of Oct. 28, 1919. Here an automobile was seized as having been used for the illegal transportation of liquor and a mortgagee filed his claim of lien on the car. The rights of a valid subsisting mortgage against a car seized for forfeiture were not questioned by the court.

Under these rulings the practice seems to be to satify first the mortgagee's claims in the property. The forfeiture reaches only the right or interest of the guilty party or parties in the automobile seized.

Now in looking up the Arizona statute, I find it in harmony with the decisions from the states cited above. In section 3, chapter 58, of the laws of 1919 (Arizona) it is said:

"Any person other than the one in custody of said property at the time of its use in such unlawful transportation, claiming the same as owner thereof, must prove by satisfactory evidence that said property was stolen from such claimant or used for said unlawful purpose without his knowledge and in which event the court shall make no order of forfeiture of said property."

It will be noted that claimant to a seized car may recover same from forfeiture by showing it was "used for said unlawful purpose without his knowledge." Since this is the statute, why should not a lien claimant, a mortgagee, be protected in his lien? I think the holdings of the Alabama, Georgia and Oklahoma Supreme Courts protecting the rights of mortgagees, as well as the ruling of the Federal court, should be sufficient to win your case, and I feel your own Supreme Court would uphold a decision along these lines.

Kansas is the only state I have found out of line, but I think such a ruling vicious and detrimental to the automobile industry, and, in particular, to sellers of cars who must sell often on a conditional sales contract or by taking back a mortgage.—Wellington Gustin.

The Readers' Clearing House

THIS department is conducted to assist dealers and service station executives in the solution of their problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert and P. L. Dumas; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; General Business questions by MOTOR AGE organization in conference.

Anti-Freezing Radiator Solutions

ALCOHOL AND WATER

For zero weather use water, 75 per cent; alcohol, 25 per cent.

For 10 below zero, water, 70 per cent; alcohol, 30 per cent.

For 20 below zero, water, 60 per cent; alcohol, 40 per cent.

GLYCERINE AND ALCOHOL MIXTURES

For not lower than 5 below:

Alcohol	15 per cent
Glycerine	15 per cent
Water	70 per cent

For not lower than 20 below:

Alcohol	20 per cent
Glycerine	20 per cent
Water	60 per cent

ENGINE KNOCKS BADLY

Q—We have a 1914 Cadillac with the four-cylinder copper water jackets, which seems to knock at the very least exertion. The carbon deposit is very small, but the burning out of this small amount of dust rectifies it for a very short time. Retarding the spark a trifle rectifies the knock also, but there is no power which makes it worse. We have put in different dome caps to cut down compression, but this did little or no good. Sinclair gasoline and Texas motor oil are used exclusively. Give your advice on this problem.—F. Ketter, the Knickerbocker Garage Co., Cleveland, O.

The symptoms displayed by this engine indicate one or two things that might be wrong. The removal of all carbon causing the knock to disappear shows that the engine is subject to pre-ignition. If the pistons were loose, a slight rocking of the piston before its arrival at top dead center would cause the piston slap. This would be noticeable only when there was carbon in the cylinders. The proper vaporization of the fuel in old cars causes a multitude of unexplainable knocks. We have seen cases of numerous knocks that have been cured entirely by the application of a hot-spot of the replacement type to the old inlet manifold. We would strongly advise an examination of the pistons and the cylinders as regards diametrical clearance, and would recommend that you install one of the replacement type

hot-spot. These are inexpensive and, as before stated, have been instrumental in eliminating many of the elusive knocks. We are supplying the name of a very successful replacement type hot-spot.

ACTUAL HORSEPOWER OF VARIOUS ENGINES

Q—Publish power curve for the following cars: Merecr, Porter, Winton, Cadillac eight, Nash six, Essex, Buick six, Hupmobile, series R, and Hudson.—P. W. Grobe, Watertown S. D.

Due to lack of space we cannot print the power curves of the engines mentioned, but will give you the revolutions per minute at which the engines show their peak of power. Mercer, 73 hp. at 2800 r.p.m.; Porter, not available; Winton, not available; Cadillac eight, 82 hp. at 2700 r.p.m.; Nash six, 62 hp. at 1850 r.p.m.; Essex, 57 hp. at 3000 r.p.m.; Buick six, 58 hp. at 2200 r.p.m.; Hupmobile, series R, and Hudson, curves not available.

POSSIBLE TO CHARGE MAGNETS ON ALTERNATING CURRENT

Q—Publish a diagram showing the apparatus and method for charging a Ford magneto on 110-volt alternating current circuit.—J. J. Melody, Arcola Motors Co., Arcola, Ill.

It is impossible to charge Ford, or any type of permanent magnet, on an alternating current. Instructions for charging Ford magnets on 110-volt direct current were published in the Nov. 17 issue of MOTOR AGE.

OIL LEAKS INTO GENERATOR

Q—Advise how to stop the crankcase oil vaper from getting into the Ford generator. We have tried several styles of watchers on this Ford, but the vapor soon gums up the generator on some Fords, necessitating frequent cleaning, while others get along nicely.—J. H. Mills, Jr., Fort Worth, Tex.

A high-grade felt washer is the best oil baffle we know of.

INFORMATION ON RAYFIELD RACING CAR

Q—A Rayfield Sunbeam car has the radiator behind the engine and is a six-cylinder T-head with 3 in. bore, four-speed transmission and rear axle in one unit with 32 by 3½ clincher rims. What year was this car built?

2—What is the horsepower?

3—What is the piston displacement?

4—What is the stroke?

5—What is the revolution per minute?

6—Will the clutch stand the grind of racing?

7—Would the thermo-syphon cooling system with a Frontenac racing radiator take care of this engine for dirt track racing?

8—Would lightening the flywheel increase the getaway and speed of this engine?—A. C. DeLinde, Chicago, Ill.

1—We do not know when this car was built. A Rayfield racing car of L-head design was entered into the 1914 Indianapolis race.

2—This is not known.

3—The piston displacement of the car, described as entered in the 1914 Indianapolis race, was approximately 490 in. displacement.

4—The stroke of the engine in the car referred to is 5½ in.

5—This information is not available.

6—It is impossible for us to answer this question definitely. There are no records of any clutch trouble on this car during a race.

7—We are inclined to think that would be sufficient for cooling.

8—Offhand, we should say no. Not knowing the weight of the flywheel, we are unable to give accurate data concerning this car. Perhaps some of our readers can supply us with information as to the history and specifications of this car.

WANT TO BUILD GROWLER

Q—We are contemplating building a growler for testing armatures. Send us wiring diagram and instructions.—Otto Ash Machine Co., Havre, Mont.

Usually the cost of constructing a growler is far greater than the purchase of a new one, and we do not recommend their manufacture at home. The names of firms supplying this equipment will be supplied by mail.

BUILDING ADVICE

CONSTRUCTING REINFORCED CONCRETE FLOOR OVER BASEMENT

PLAN No. 368

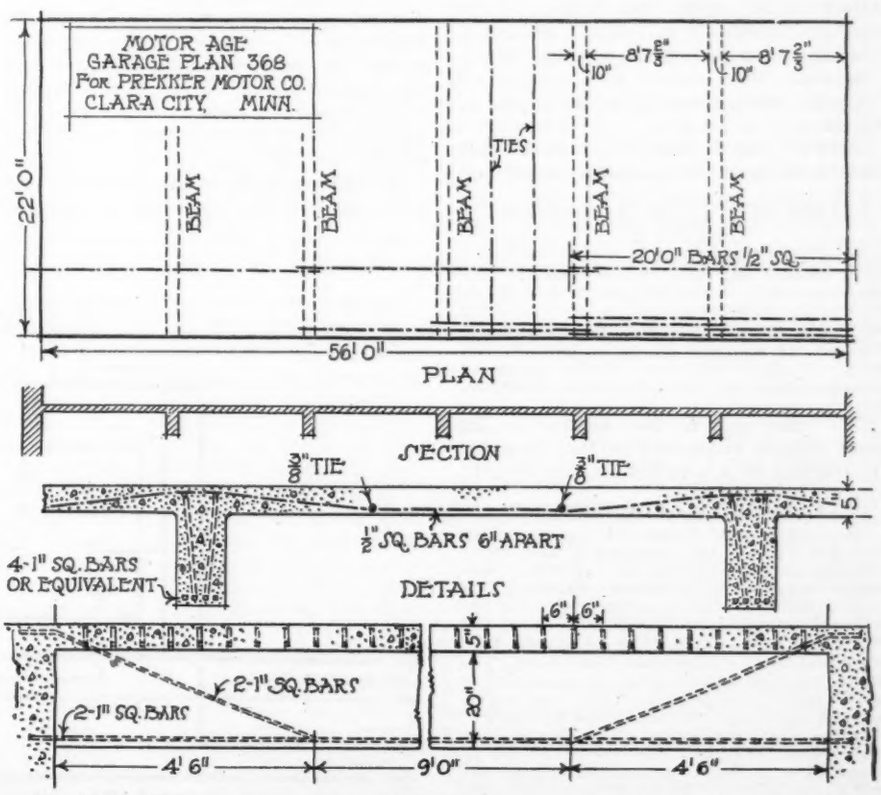
Q—We have been reading your paper for a number of years and wish to ask your advice. We are going to build a garage of hollow tile, and, as we are going to have a basement in the rear 22 by 56 ft., which will be under our workshop, we want to know how to make a reinforced concrete floor over this basement.—Prekker Motor Co., Clara City, Minn.

It is not good policy for one to do concrete work who is not trained to figure the strains and stresses on the concrete and steel. There are a dozen different ways of doing your job, but we have selected a simple one in order to give you less chance to make mistakes.

The floor is a five-inch slab supported by five 20-in. beams spanning the width of your basement. It is, of course, understood that these beams must have a solid foundation on the wall and that the whole job of pouring the concrete is to be done at once, so that beams and slab will be as nearly one piece as possible. The rods must be cut and bent to measure before-hand and wired firmly into position in the forms. Competent workmen must watch the work carefully to see that they are not displaced by the concrete men.

The concrete should be one part cement, two parts clean torpedo sand and four parts hard gravel or good crushed stone that will pass a one-inch mesh screen. Avoid too much fine sand and sand mixed with clay, both of which weaken the concrete. Large stones in the gravel must be screened out, as they prevent the concrete from working in around the steel and tend to force it out of position.

If 20-ft. rods can be obtained they will be just right for the floor slabs since they will extend across two sections and lap tightly. Break the joints or, in other words, alternate the joints, making those of one series come in the center of the adjacent rods instead of making all the joints over one beam.



Plan 368—Plan and cross section of reinforced concrete floor over basement with details showing placement of steel rods, etc.

QUESTIONS CONCERNING PULLMAN

Q—Publish wiring diagram of cranking and lighting system of model 4-24, 1916 Pullman.

2—Advise how to adjust the main bearings.

3—How can the generator be tested to find if windings are all right?

4—Advise how to test the relay.

5—What was the manufacturers' list price of this car?

6—What is the horsepower?

7—Could wire running from the battery to the ignition switch be changed to the same used on the 1915 Pullman, using same switch?—E. L. Generson, East Syracuse, N. Y.

1—The wiring diagram for this car is shown in Fig. 1.

2—First remove the oil pan so as to gain access to the bearings. Place a jack under the crankshaft near the bearings and pry up and down on the shaft slowly. Watch the oil film to see if oil is being forced out. If so, remove the bearing cap and take out one of the shims. Remove the thinnest shim on each side and replace the cap and tighten. Turn the engine, and if a decided drag is noted, the bearing is tight. Great care must be taken to remove the same number of shims from each side of the journal. When all main bearings are adjusted, it should be possible to crank the car by hand.

Generator can be tested by using an ammeter in series with one cell of a battery and with test points. Hold test points on each pair of consecutive bars of the commutator. Ammeter should read the same for each pair. A high reading indicates a short; a low reading an open. For testing the field coils and for testing the armature for grounds use the entire battery and a voltmeter in place of the ammeter, holding one test point on each bar of the commutator consecutively and grounding the other test point. If the voltmeter reads, it indicates a ground.

4—Refer to July 28 issue, page 32.

5—$740.

6—The horsepower is 22; bore, 3¾ by 4¼ in.

7—We would not recommend this change, as it entails much wiring service.

LOSS OF WATER IN STORAGE BATTERY

Q—The 12-volt Willard battery on a 1915 Dodge car had the separators and cell renewed. Now this cell takes about three times as much water as the other cells. It doesn't leak and the hydrometer test shows all cells to be in good condition. What is the cause of the excessive consumption of water?—James Pearson, Colfax, Ia.

We refer you to the answer in the next column submitted to Mr. Theodore T. Durand as a solution to this trouble.

EVAPORATING ELECTROLYTE

Q—I put a new Vesta battery in a Ford car for one of my customers and these are the conditions: one cell requires constant renewal of distilled water. This cell is the one that is connected with the ground terminal or negative side of the battery. The generator is charging normally 10 amp. without the lamp load. The starter motor is all right and the battery will operate the starter when the motor is cold and hard to turn over by hand.

After the car has been driven 15 or 20 miles, the electrolyte lowers to the top of the plates. I took this battery out of the car to look for a leaking cell or short circuit between the plates. Positive, as well as negative plates, were in perfect condition; separators were as good as new and there was still good electrolyte in the cell. I could not see a thing wrong, but nevertheless, I put in new separators and a new jar. The battery was recharged and put in service again in this same car, but the same conditions were still present. I then took this battery out of service and put in a battery of my own. This battery is a rental battery and acted the same as the other one in the same conditions. I have used up a good many quarts of distilled water for these two batteries, but the matter is still a mystery.—Theo. T. Durand, Red Hook, N. Y.

There are three major causes which would produce these conditions: first, an internal short; second, battery near some source of heat; and third, a slight crack in the jar. We are inclined to think that both of these batteries have a slight internal short. You have not mentioned whether or not a voltage discharge has been given these batteries. This will determine whether there is an internal short. To do this, the battery should be fully charged, and a voltmeter placed on each cell and discharged and the reading noted. Although the electrolyte may show a good gravity reading, it will not detect the presence of an internal short-circuit.

In the case of the slight crack, it could be so small that it could not be detected and the water would not show except after long periods of usage. Regarding the battery near source of heat, it might be possible that this battery is installed close to the exhaust pipe, which would cause the water to evaporate very rapidly. It is possible, though not very probable, that the new separators have different qualities of absorption than the ones formerly used. We would recommend strongly that these batteries be given a thorough voltage discharge test, as outlined above.

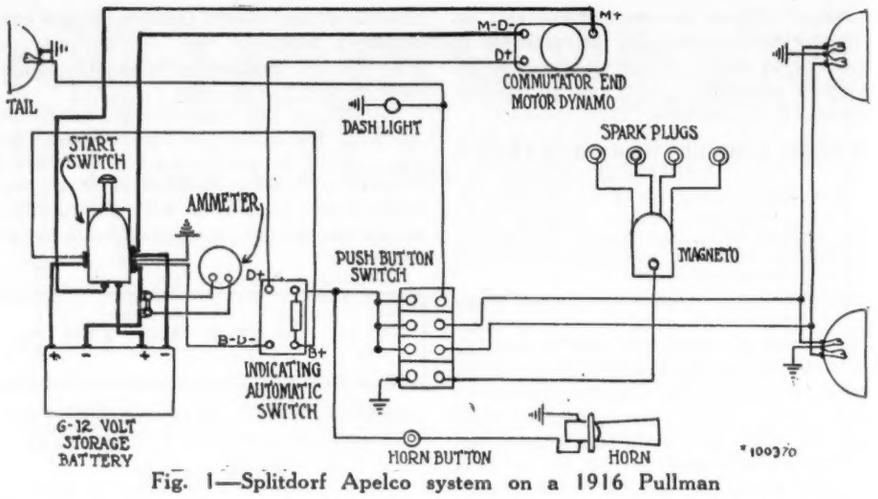


Fig. 1—Splitdorf Apelco system on a 1916 Pullman

WIRING SAXON ROADSTER

Q—Publish wiring diagram showing internal connections of the motor generator, as used on the little four-cylinder Saxon roadster.—W. M. Beaver, Charleston, W. Va.

The diagram in Fig. 2 shows the connections between motor generator and controller. If you can supply us with the model number of the motor generator we can supply internal connections.

CHANDLER S.A.E. RATING

The following correction is offered for the typographical error in the November 17, issue on page 38. The S. A. E. rating of the Chandler is given as 27.34, whereas it should have been 29.4 h.p.

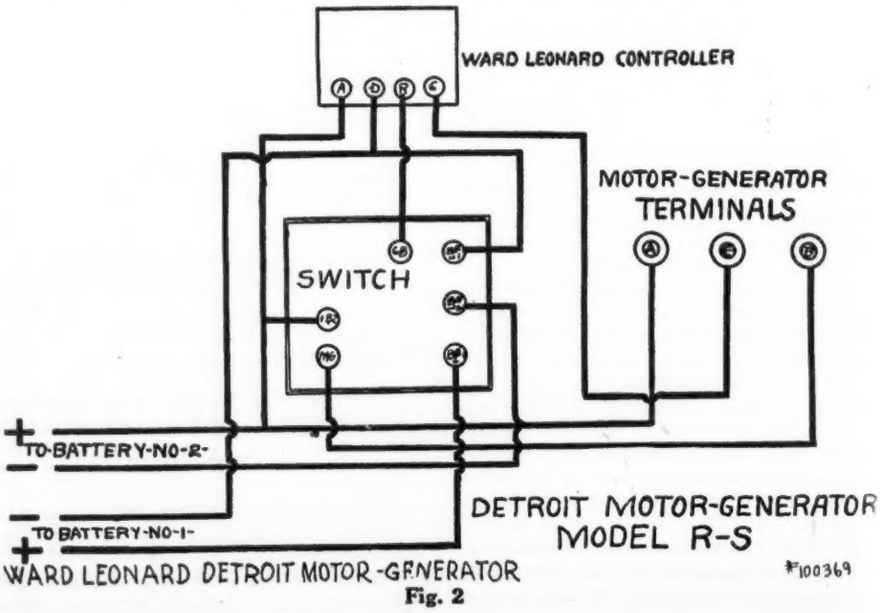


Fig. 2

BEARING TROUBLE

Q—What causes a Chevrolet, model 490, to continually burn out the center main bearings? The oil hole is open each time, and all the rest of the bearings get plenty of oil. The oil pump works and the bearings are not set up too tight; the engine can be spun by hand. We are at a loss to know what causes this trouble.—W. G. Robertson, Diller, Neb.

This trouble, without a doubt, is due to a badly sprung crankshaft. We would recommend that you remove the crankshaft from the engine and place it between centers on a lathe where it can be tested for straightness with the aid of a dial surface gage.

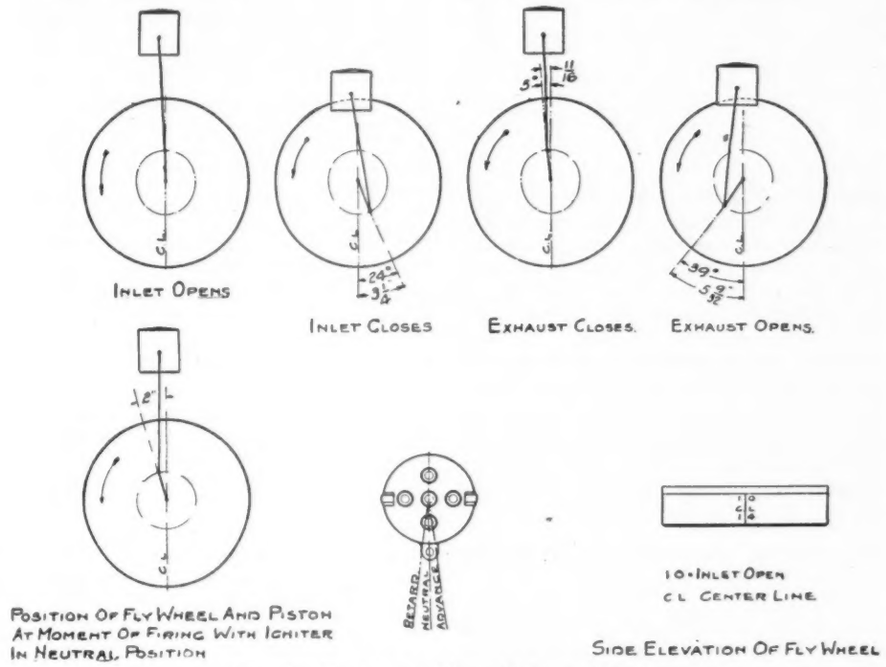

INLET OPENS
INLET CLOSES
EXHAUST CLOSES
EXHAUST OPENS
POSITION OF FLY WHEEL AND PISTON AT MOMENT OF FIRING WITH IGHITER IN NEUTRAL POSITION
1.0-INLET OPEN
C L CENTER LINE
SIDE ELEVATION OF FLY WHEEL

Fig. 3—Timing of Hupmobile model N

ENGINE OVERHEATS

Q—A Hupmobile, model N, 1917, gets hot and boils water if driven for five or six miles at the rate of 20 or 30 m.p.h. A new radiator was installed, but did not help. It uses three quarts of oil every 100 miles, and one gallon of gas every eight miles. I have installed new rings, but they don't seem to do any good. The car has good pep until it gets hot. Smoke comes out of the crankcase as soon as the engine gets warm.—O. E. Maddox, Ingersoll, Okla.

The overheating could be due to several causes, prominent among which are internal friction in the engine, due to rings fitting too tightly, or engine out of time with regard to valve and ignition. Also there could be a drag in the car some place back of the engine which would cause the engine to overheat. Would suggest that you look over the brakes, wheels and hose connections; also jack up the rear wheels and run the engine at 25 m.p.h. by the speedometer with the gear in high, then note whether the engine overheats. If the engine overheats equivalent to 25 m.p.h., but with the clutch out, it would denote that the drag is not in the rear assembly. The timing of the valves and ignition are shown in Fig. 3. The smoke out of the crankcase denotes loss of compression at the rings. It is possible that the rings are fitted too tightly at certain points, due to the fact that they may not be exactly the proper diameter, or cylinders may be out of round. If the car has had the rings installed only recently, you cannot expect performance from the engine until the car has been driven several hundred miles. The cylinders will show slight scratches and sometimes noticeable score marks if the rings have been fitted too tightly. Would suggest that you examine the engine by lowering a flashlight bulb which previously has been connected to a flashlight battery through the valve port plug hole.

TIMING VALVES

Q—We would like to know how far the piston travels on the intake stroke on No. 1 cylinder before the camshaft starts to open the inlet valve. Tell what part of an inch, and the firing orders of the following cars: Ford, Chevrolet 490, Saxon 125, Maxwell 25, Oldsmobile 43A, Studebaker EJ 40, Overland 4, Buick 21, 44, 5, 6, 7; Chalmers 6-30, Hupmobile, series R; Reo 6, Jackson 6-38.—Mike Doros, Saskatoon, Sask., Can.

On engines using only one camshaft the easiest way to set valves is to set them by the exhaust valve. In nearly every case the exhaust valve closes at or a very little past upper dead center. An easy method is to calculate the inches traveled by the number of teeth on the camshaft gear, bearing in mind that the camshaft travels at half the speed of the crankshaft and that 10 deg. on the crankshaft equals five deg. on the camshaft. This is the easiest method because many flywheels are covered almost entirely and one cannot lay out degrees on the flywheel.

As we have no data giving the number of teeth on the camshaft gear of the cars mentioned, we will give the timing in degrees, from which you can arrive at the proper travel in inches. Chevrolet intake opens 16 deg. after upper dead center; intake closes 52 deg. past lower dead center; exhaust opens 40 deg. before lower dead center and closes 16 deg. past upper dead center. Maxwell: intake opens six deg. after upper dead center; closes 32 deg. after lower dead center; exhaust opens 40 deg. before bottom dead center and closes six deg. after top dead center. Chalmers 6-30: intake closes 50 deg. after lower dead center; exhaust opens 50 deg. before bottom dead center; exhaust closes 10 deg. after top dead center. Hupmobile: intake opens 12 deg. after upper dead center; closes 44 deg. after lower dead center; exhaust valve opens 44 deg. before bottom dead center and closes 12 deg. after upper dead center. Reo T-6: inlet opens 17 deg. after upper dead center; inlet closes 45 deg. after lower dead center; exhaust opens 54 deg. before bottom dead center and closes 10 deg. after upper dead center. Jackson 6-38: inlet opens 8 deg. after upper dead center and closes 40 deg. after lower dead center; exhaust opens 40 deg. before bottom dead center and closes 12 deg. after upper head center. Buick 21: inlet opens 3/32 in. past upper dead center, and closes 13/32 in. past lower dead center; exhaust opens 15/64 in. before lower dead center, and closes 1/16 in. past upper dead center. Buick K 6-45: inlet opens 15 deg. after upper dead center, and closes 38 deg. after lower dead center; exhaust opens 12 deg. before bottom dead center, and closes 12 deg. after upper dead center. Ford, model T: intake opens .0625 deg. after upper dead center, and closes .5625 deg. after dead center; exhaust opens .3125 deg. before bottom dead center.

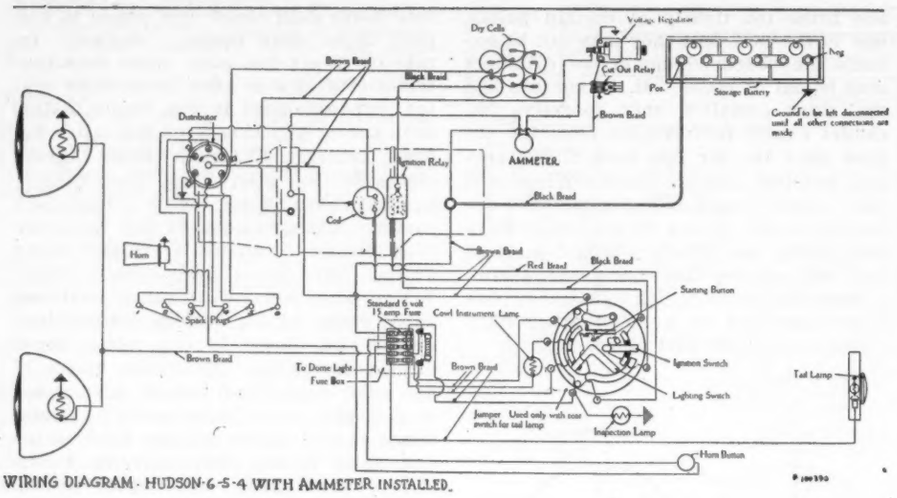
It will be noted that on the Ford and Buick model 21 that the timing is given in fractions of an inch of piston travel.

Oldsmobile, model 42 and model 55: intake opens 15 deg. after upper dead center, and closes 38 deg. after lower dead center; exhaust opens 45 deg. before bottom dead center, and closes 10 deg. after top dead center. The timing of the Buick 45 is the same as model 44. Overland four: intake opens .97 after upper dead center, and closes 2.83 after lower dead center; exhaust opens 3.64 before bottom dead center, and closes .81 after top dead center. The timing of the Saxon model 125 and Buick models 46 and 47 is not available.

OVERLAND MODEL 83 WILL NOT THROTTLE DOWN

Q—We have a 1916 model 83 Overland which misses on No. 3 cylinder when idling or running on the level up to 18 m.p.h. Over this speed or on a pick-up, it runs all right. Ignition and compression are good; we have just cleaned the carbureter, ground the valves and removed the carbon. Adjusting the carbureter does not help. The valve stems are slightly worn. Can this be the cause, or will I have to install a late model carbureter?—David P. Sand, Racine, Wis.

If the compression is good and a strong hot-spark is present at the spark plug, the trouble, without a doubt, is due to an air leak somewhere in the gas distribution system to No. 3 cylinder. Examine closely all manifold joints that lead to No. 3 cylinder. Also check carefully valve tappet clearance; this should be at least .010 in. Spark plug points should be set at .022.



WIRING DIAGRAM · HUDSON·6-5-4 WITH AMMETER INSTALLED.

Fig. 4

WIRING DIAGRAM OF OLD TYPE HUDSON

Q—Publish diagram of starting, lighting and ignition circuit.

2—Publish diagram of battery charging apparatus carried on the runningboard.

3—Do you think the so-called inner rings used to place under the piston ring between pistons cut down power by their friction?—Lawrence Vaughan, the Roadside Repairshop, Cement, Okla.

1—Complete wiring diagram of Hudson 6-54 is shown in Fig. 4. This also shows the voltage regulator used on this car.

2—We have no diagram of this apparatus, but the wiring diagram in Fig. — shows all necessary connections.

3—It is contrary to our policy to recommend or condemn any accessory.

EXCESSIVE GENERATOR CHARGING RATE

Q—Publish internal wiring diagram of the Heinze system used on 1917 Regal.

2—This generator puts out too much current. The ammeter needle goes clear against the stop pin when the car is being driven 15 m.p.h. The ammeter needle often drops back to zero, then right over again to the stop pin.—L. H., Burke, S. D.

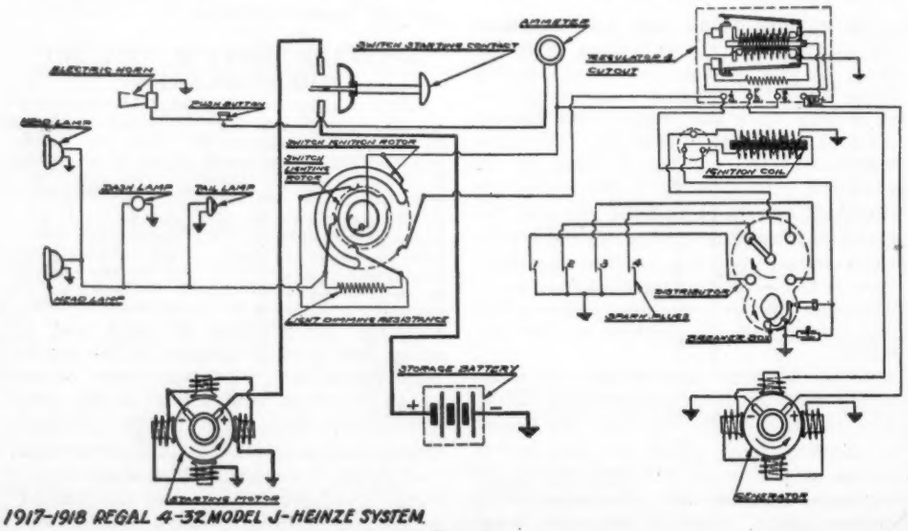
1—The wiring diagram is shown in Fig. 5.

2—The conduct of the generator denotes either a defective cutout relay or a loose connection in the wiring. To test, first clean the points thoroughly on the cutout and adjust the springs lightly. If points are not clean, only a portion of the cutout resistance will be brought into the circuit, the remainder will go to the battery through the ammeter and will show this high reading. If after cleaning cutout points and adjusting the spring the ammeter continues its behavior, we would advise that you attach the meter to the generator direct and denote whether output is steady. Any unsteadiness in the current flow will show that the trouble is in the generator.

1919 MODEL 490 CHEVROLET HEATS TO EXTREMES

Q—A 1919, model 490, Chevrolet has been heating to extremes all summer. It always pulled well, and started easily and had good compression. We were advised to use Mobile E Arctic oil and this cured the overheating. In about two weeks the cylinders got dry and the engine did not have any more rebound action, such as they have when they are well lubricated, because when the switch was shut off, the engine would stop almost instantly; this it never did before. I have changed the oil three times in the last six weeks, and once I put in enough to let the connecting rods dip in it, but that did not seem to help it. I have put oil in the firing chamber; then for a while the engine would rebound until the oil was gone. I have had the engine apart and it is set according to marks. I know the pump is working well and the oil passages are open—if they were clogged the bearings would burn out. What do you think of this condition?—F. W. Lange, Atwood, Wis.; P. O., Owen, Wis.

Mobile oil E is the recommended oil for this engine. You apparently have no great cause for worry, due to the engine not showing any rebound. If the engine were being underlubricated the cylinders would be scored by this time. Try using an oil just slightly heavier than the Mobile oil Arctic; such an oil is Mobile E. If this fails to satisfy you, you might add a very small quantity of oil to the gasoline in the gasoline tank. A pint to seven gallons of gas will be sufficient to lubricate the pistons and rings.



1917-1918 REGAL 4-32 MODEL J-HEINZE SYSTEM.

Fig. 5

TESTING COMPRESSION

Q—What is the effect of uneven compressions? Test shows cylinder No. 1, 60 lbs. compression; cylinder No. 2, 65 lbs. compression; cylinder No. 3, 65 lbs.; cylinder No. 4, 70 lbs.; cylinder No. 5, 65 lbs.; cylinder No. 6, 65 lbs.

2—How can compression be made the same in all cylinders?

3—What is the correct compression for 7-N Continental engine? (As used on 1918 Roamer.)—Fred Haase, Chicago, Ill.

1—Uneven compression affects the carburetion. This is most noticeable at low speed with the engine idling. It also can be noticed when pulling, at which time the exhaust noise will not be uniform from the weak cylinders.

2—The compression can be made equal in all cylinders if the rings are fitting properly and cylinders are perfectly circular at all points. You do not state how this compression pressure was arrived at. There are several different methods, although we do not know the method used by the Continental Engine Co. on their dynamometer test card, which shows a compression pressure of approximately 62 lbs. for this model engine. To get a really accurate reading on a cylinder, the inlet manifold should be removed and the engine should be cranked at exactly the same speed when testing for each cylinder. The compression shown on these will vary with the throttle opening. To eliminate the variation, remove the inlet manifold. The variations shown on your table should not affect to any great degree the performance of the engine.

3—Refer to No. 2.

MAKING AN ELECTRO MAGNET

Q—Advise concerning the size and length of wire used in making an electro magnet.

2—What size and length of cores? I want this charger to operate from a six-volt battery.—Frahma Garage, Manning, Ia.

1—No. 13, gage B. & S., 300 ft. long.

2—½ by 5 in. This should give about 10,000 amp. turns. It should consume 10 amp. at six volts.

OVERPRIMING

Q—Is it impossible to flood the engine, due to too much priming or use of choke? A. D. Stuehm, Peotone, Ill.

Excessive use of the choke will cause raw gas to be drawn into the cylinders in such quantities that it will flood the engine.

COUNTERBALANCING 90 DEG. V-TYPE ENGINE

Q—In counterbalancing, is only the offset weight of the crankshaft considered, or the weight of the pistons compensated for?

2—What weight of counterbalance and what shape are necessary to counterbalance this engine?

3—How should these counterbalances be attached to a crankshaft having the peculiar shape and dimensions of this one? In this regard, notice that the crank pin and crankshaft are hollow, having walls ¼ in. thick.—L. R. Rohr, Humphreys, Va.

1—In a two-cylinder 90 deg. Vee engine with both rods on one crank, the primary forces can be balanced by counterweights, but the secondary force, which has a frequency twice that of crankshaft rotation, remains. If a connecting rod of infinite length were used, the secondary force would be reduced to nil. The connecting rod and crankshaft may be balanced as follows: Here r equals r; equals distance to center of gravity. The weight of "C" equals the weight of the crank. Then only the weight of the crank pin and that portion of the connecting rod considered as rotating remain to be balanced. For the sake of brevity in computation, five-eighths of the weight of the rod can be considered as rotating.

W equals W^1 plus W^2.

Where "W" equals balance weight in pounds, W^1 equals weight of crankpin, W^2 equals weight of five-eighths of connecting rod.

2—As we have not the weight of the connecting rod, we will leave the actual computation to you.

3—This suggests several difficulties on the O.X. crankshaft. The only one method that suggests itself is to dovetail the counterweights into the crank arm, holding them in position by a 3/16 in. nickel steel bolt, or two 3/16 in. bolts through each crank arm. "W" is the total weight which should be divided by two to secure the weight necessary for each crank arm counterbalance.

OVERHAULING OLD MERCER

Q—Advise the proper valve timing for a Mercer model 35R engine, both by degrees and by inches, or whatever way you think it would be the best, as I do not know much about the timing by degrees or inches.

2—Give instruction how to hook up a pressure feed system and where the check valve is located.

3—Advise how to tighten up the rear end and where the felt washers are located to prevent the grease from coming out on the brake drum.

4—Is there any possible way in which I can get more speed out of this engine?—Jack P. Heidenfelder, Brooklyn, N. Y.

1—The factory valve timing for the 35R Mercer engine is: intake opens seven degrees early, exhaust closes at top dead center. This being a T-head engine, to time it proceed as follows: place No. 1 piston at top dead center. Turn exhaust camshaft in direction of rotation until exhaust valve has just closed. This can be determined by placing a cigarette paper between the valve tappets and valve stems; the place where the cigarette paper is just releasd is the point where the valve has just closed.

When this is accomplished, mesh exhaust camshaft gear with crankshaft gear. This completes the timing for the exhaust valve; the intake valve should open seven degrees previous to the closing of the exhaust. Seven degrees is determined by reducing degrees to fractions of an inch. This means that the intake valve should open approximately 1/16 in. before the closing of the exhaust. By turning the engine against the direction of rotation until the piston is 1/16 in. below upper dead center, the intake valve can be set. Turn the camshaft until the cigarette paper placed between tappets and valve stems is held firmly, and see that the valve has just started

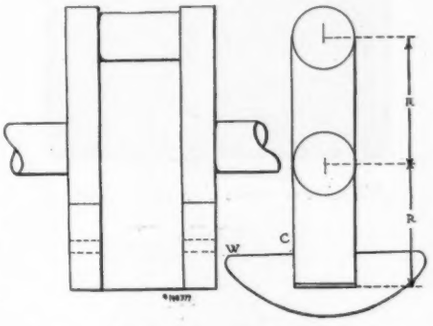


Fig. 6—View of crankshaft for two-cylinder V-type engine

to open. With pistons approximately 1/16 in. before upper dead center and camshaft with intake valve just opening, mesh the gear on the intake camshaft with the crankshaft gear, and the timing is completed.

It is well to check over the timing after the gears have been meshed, and remember, when meshing, intake camshaft gear piston is to be moved only 1/16 in. against direction of rotation or from the position where the exhaust valve was set.

2—We would strongly advise not to install a pressure system on this car. The vacuum system, if properly installed, should prove entirely satisfactory. It should be a large type of vacuum tank.

3—The felt washers are located at the outer ends of the axle housing and wheels.

4—The only way to secure greater speed from this model is through a general lightening of weight throughout, and careful balancing and assembly. Cylinders and rings should be cylindrical and in good shape with all bearing just as smooth and free from friction as possible. The fenders should be removed if the maximum speed is desired. If the car is equipped with cast iron pistons a slight gain in speed could be realized by the utilization of aluminum alloy pistons and use of only two rings.

CONSTRUCTING COPPER SULPHATE CELL

Q—Supply me with information regarding the construction of a blue vitriol battery for testing purposes. I would like to know how large the jar, crow-foot and copper must be to get a certain voltage.

2—I want to use round earthern jars. How much blue vitriol must be used?

3—Will this battery run down when not in use?

4—Give me the address of the Weston-Mott Co., the makers of Weston-Mott rear axles.—Edward C. Fritz, Oklahoma City, Okla.

1—The area of zinc and copper element in a gravity battery have no bearing at all on the voltage produced. The output will be from one to one and one-fourth volts regardless of the size of the elements.

2—Enough copper sulphate should be used to obtain a fully saturated solution. Copper sulphate crystals on the bottom of the jar will do no harm.

3—No.

4—Flint, Mich. The crow-foot and zinc element can be obtained from any of the electrical supply houses.

TUNGAR RECTIFIER

Q—Is it possible to secure the diagram and the size wire, as well as the number of turns and the insulation that is used in the construction of the Tungar rectifier in the 220 and 110-volt, 10-battery sizes? Advise where I can get full particulars.—R. M. Livingston, Kankakee, Ill.

The Tungar rectifier is manufactured by the General Electric Co., Schenectady, N. Y. We have no engineering data concerning this machine and would advise that you communicate with the manufacturer.

DIRECTION OF FLOW OF SECONDARY CURRENT

Q—In what direction does the secondary current flow from a Ford high tension coil if the primary current supplied to the coil is an alternating current?—Lea Gotch, Represa, Calif.

All high tension secondary current is a high frequency oscillating current and could therefore be called really an alternating current, although this is not strictly accurate, because some machines produce a varying amplitude undirectional current.

USE OF BURNING-IN MACHINE

Q—We have a burning-in stand in which we have to run the bearings in the opposite direction from the way the engine runs. What difference would it have on the bearings in running, or would it make any difference?—C. H. Woodson, Greenville, S. C.

It would make no difference.

INSTALLING SLIDING GEAR TRANSMISSION IN A FORD CAR

Q—Is it possible to install a sliding gear transmission in a Ford, using the present engine and transmission?—Westchester Lighting Co., Mt. Vernon, N. Y.

Yes, there are several sliding gear replacement transmissions being manufactured for installation on the Ford car, retaining the original Ford transmission.

CORRECTION OF POWER CURVE

Q—In issue No. 13, of Sept. 29, 1921, there is inserted on pages 32 and 33, two power curves for Chevrolet, models FB and 490. It seems to us that the last one of these curves is peculiar, inasmuch as it shows a horsepower of 50 at a revolution of 1800-2000. In the text on the same pages the number of horsepower is mentioned as 25. Please explain same.—A. Wiklunds Maskin & Velocipedfabrik, Stockholm, Sweden.

The curve of the FB Chevrolet is correct. The brake horsepower of the model 490 should show a maximum of 25 hp. at 2000 r.p.m. This was a typographical error and was due to improperly graduating the paper on which the chart was made.

The ACCESSORY SHOW CASE

New Sources of Retail Profit

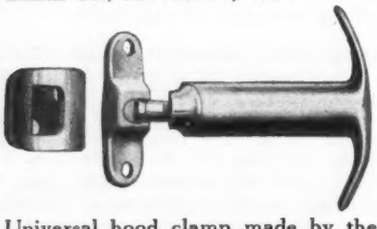
POINDEXTER AUTOMATIC AIR SPRING

This air spring consists of four essential parts: the outer shell secured to the frame of the car; a piston attached to the spring of the car, and a pumping plunger operating in a pumping cylinder. As the air pressure held above the piston increases, the piston is forced down until slots in the pumping cylinder come to the pumping plunger, at which point the pumping stops automatically.

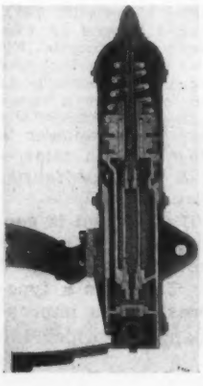
The chamber in the main piston serves as an oil reservoir and the oil supply therein serves as a lubricant and seal against air leakage. The action of the car spring causes the piston to move up and down in the shell, thus the air springs, by means of the pumping members, automatically pump to a fixed volume, regardless of the weight of the car, placing about 50 cu. in. of compressed air under each corner of the car. Price, set of four, $165. American Pneumatic Equipment Corp., 2915 Olive street, St. Louis.

A. O. SMITH STEEL RUNNING-BOARD

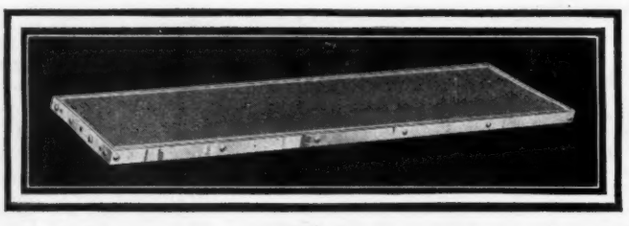
This new steel runningboard is of the same weight as those of wood and is very rigid. In the event of damage as a result of collision, it can be hammered back to its original appearance. This steel runningboard can be easily attached. It is furnished in two styles of covering—linoleum and aluminum. The linoleum is glued to the steel under great pressure and is then edged and riveted. The aluminum style is fully riveted. A. O. Smith Co., Milwaukee, Wis.



Universal hood clamp made by the Stewart Mfg. Co., 1527 Jackson St., Los Angeles, Cal.

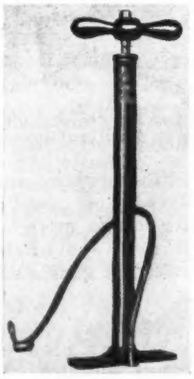


Poindexter automatic air spring

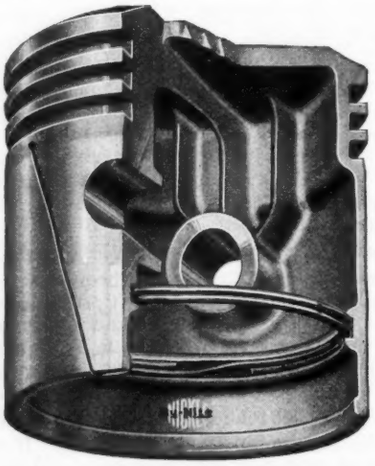


A. O. Smith steel runningboard

Aluminum mats for runningboard



Kentucky thoroughbred pump



Bu-Nite piston manufactrued by the Butler Mfg. Co., Indianapolis

MARVEL STEERING WHEEL SILENCER

This device is designed to eliminate any end play in the Chevrolet 490 steering column and to prevent vibration and rattle.

An aluminum clamp is fastened at the lower end of the steering column and on the lower surface of the aluminum clamp is a recess into which seats a spring steel compression washer, so that by tightening the clamp with slight pressure and tapping downward, the "backlash" or end play in the shaft is instantly pulled up tight.

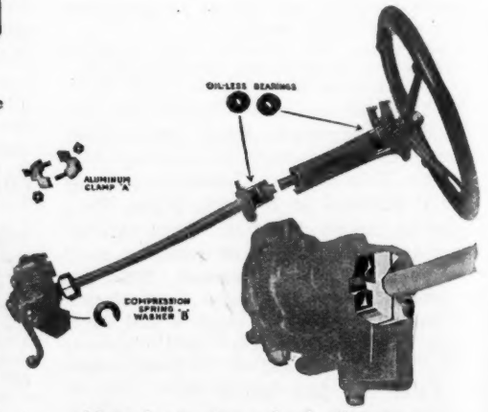
Two special oil-filled bearings are furnished with each set to be inserted in the mast jacket in case of looseness or vibration between steering column and mast jacket. Price $1.60 complete. Marvel Shock Absorber Corp., 1250 West 76th street, Cleveland, O.

KENTUCKY THOROUGHBRED PUMP

Embodying a new pumping principle, the Kentucky Thoroughbred pump has an intake of clean air through the top of a hollow piston rod, direct to the compression cylinder, of drawn seamless steel tubing. The Handy Lox-on Junior Air Chuck clamps the hose to the valve, permitting no air leakage, and a ball check valve in the bottom hose connection prevents air from leaking back into the pump. It is finished in black enamel with lacquered steel parts and red enameled handle, and is made in two styles at $3 and $4, respectively. Kentucky Tire Pump Co., Madisonville, Ky.

ALUMINUM MATS FOR RUNNING-BOARDS

The No. A 100 is designed for Fords or any other car with a narrow runningboard. Special designs cast from an aluminum alloy are made, which take a high polish and will not rust. Wisconsin Aluminum Foundry Co., Manitowoc, Wis.



Marvel steering wheel silencer

SERVICE EQUIPMENT

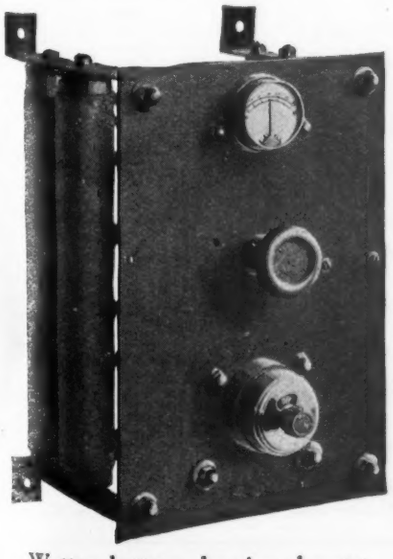
Aids for Time Saving & Accuracy

FROUSSARD CYLINDER REBORING MACHINE

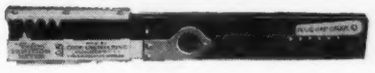
This reboring machine is built with worm drive. It can be driven by hand, by belt from line shaft or by a motor direct. It is featured with over 9 in. of bearing surface on the bar in length and 48 in. in area on the two long cone-shaped bearings, which will take up the wear, with the aid of two adjusting nuts for that purpose. Between the two bearings is the housing, containing the worm and wheel, and it is so constructed that they will not fall out of mesh, even in lifting out the bar. The cutters are made of hardened tool steel, accurately ground to size, and they are all interchangeable. The feed gear box is constructed to provide a very fine feed and still enable the use of a coarse thread on the feed screw. Multiple Boring Machine Co., 2212 Washington avenue, St. Louis.

CELCO IGNITION METER

This is a device for ignition testing, having a variable air gap arranged for a terminal to ground test at the spark plug. The motor is idled with a retarded spark. The meter is placed in contact with the terminal of the spark plug and ground. When the open air distance is set at a dimension where the resistance to the current is less than along its regular course across the points of the spark plug, the current will be shunted away from the spark plug and pass to ground through the meter, and in doing so a spark will appear on the dial. At an indicator provided the condition can be read. Price $2.50. Cook Engineering Laboratories Co., 1714 South Flower street, Los Angeles, Calif.



Wotton battery charging rheostat

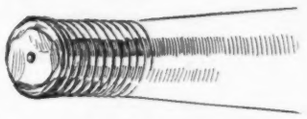


Celco ignition meter

Froussard cylinder reboring machine

Micrometer expansion reamer

Use the Right Tool



IF the mechanic who removed the wheel from this axle shaft had used a wheel puller instead of hammering the end of the shaft and "jimming" the threads, he would have saved time and done a better job. As it is, he will have to recut the threads on the shaft, or he might even try to force the nut back on without doing this.

H. & G. SOCKET AND RATCHET WRENCH SET

This set includes the following: 10 sockets for hexagon nuts, one adjustable T handle, one reversible ratchet, one universal joint, one extension piece—two screw drivers and one box wrench. The sockets, it is claimed, are made by a special process which gives the metal extra strength and permits making the walls thinner and therefore facilitates use in tight places. Eastern Machine Screw Corp., New Haven, Conn.

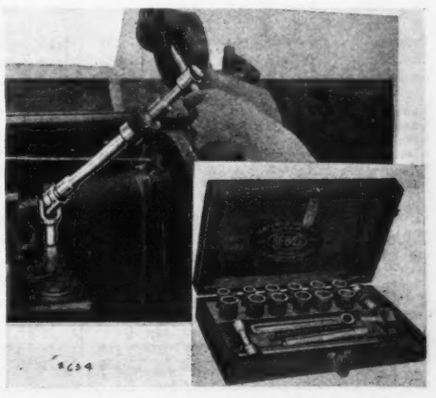
WOTTON BATTERY CHARGING RHEOSTAT

Wotton Type WR-1 Storage Battery Charging Rheostat is designed to charge starting and lighting batteries on any direct current voltage from 32 to 110 volts, taking care of a maximum of 14 batteries at one time on 110 volts, and giving a charging rate up to 10 amp. Regulation of the charging rate to the desired point is given through the regulator on the board.

The rheostat is complete with ammeter, is built on an angle iron frame with a steel panel front, and the resistance consists of wire wound porcelain tubes. A double pole snap switch breaks both sides of the line when the rheostat is not being used, and the rheostat is fused for protection against overload. It can be used either to provide charging circuits from direct current generators, or on the regular power lines. Price, $24. The Electric Products Co., 1725 Clarkstone Road, Cleveland.

MICROMETER EXPANSION REAMER

This micrometer expansion reamer is made at present in hand reamers only, ranging in standard sizes from ½ to 1½ in. in diameter. The blades are instantly adjustable without removing reamer from machine or holder. A few turns of the adjusting nut permit the removal of blades from the body. The Micrometer Adjustment is an exclusive feature. It consists of a lock nut graduated into .00025 in., and a sliding collar with zero starting point. One turn of the graduated nut increases or decreases the diameter of the cutting blades .004 in. The total adjustment of blades on sizes ½ in. to ⅝ in. reamers is .035 in. and on sizes 11/16 in. to 1½ in. is .065 in. Larger sizes can be adjusted .130 in. It is possible by the use of the Micrometer Adjustment to obtain the closest accuracy without continually using a micrometer caliper. Bilton Machine Tool Co., Bridgeport, Conn.



H & G socket and ratchet wrench set

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador R	Cont.	6-3⅝x5¼	136	33x5	....	†4500	$4500	....	$6500
American C	H-S.	6-3¼x5	127	32x4	$2195	2195	†2250	....	3150
Anderson Series 40	Cont.	6-3¼x4½	120	33x4	2195	1650	1795	$2450	2550
Apperson 8-21-S	Own.	8-3¼x5	130	34x4½	....	3000	3250	4500	4500
Apperson Anniversary	Own.	8-3¼x5	130	34x4½	....	3500	3750	....	....
Auburn 6-51	Cont.	6-3¼x4½	121	32x4	1670	1695	1760	2475	2495
Beggs 20T	Cont.	6-3¼x4½	120	33x4	1775	1520	....	2320	2420
Bell 4-32	H-S.	4-3½x5	114	31x4	....	1495	....	....	....
Bell 6-50	H-S.	6-3¼x5	124	32x4	....	1695	....	....	....
Biddle B1 & B5	Buda.	4-3⅝x5½	121	32x4	3475	†3475	....	4350	....
Bour-Davis 21S	Cont.	6-3½x5¼	126	33x4½	†2385	†2385	2385	....	....
Brewster 91	Own.	4-4 x5½	125	32x4½	†7000	7000	....	....	10500
Briscoe, 4-34	Own.	4-3⅝x5	109	31x4	1085	1085	....	1685	1685
Buick 1922-34-35-36-37	Own.	4-3⅜x4¾	109	31x4	935	975	....	1475	1650
Buick 1922-41-5-6-7	Own.	6-3⅜x4½	118	33x4§	1495	1525	....	2135	2435
Buick 1922-48-9-50	Own.	6-3⅜x4½	124	34x4½	....	....	1735	2325	2635
Cadillac 61	Own.	8-3½x5½	132	33x5	3790	†3790	3940	4690	4950
Case V	Cont.	6-3½x5¼	126	34x4½	....	†1935	1935	....	2970
Chalmers 6-30	Own.	6-3¼x4½	117	32x4	1245	1295	....	1995	2295
Chalmers 6-30	Own.	6-3¼x4½	122	33x4½	....	....	1395	....	....
Champion Tourist	Lyc.	4-3½x5	113	32x3½	....	995	†995	....	....
Champion Special	H-S.	4-3½x5	118	32x4	†1195	1195	....	....	....
Chandler Six	Own.	6-3½x6	123	33x4	1785	....	1785	2785	2885
Chevrolet 490	Own.	4-3⅛x4	102	30x3½	525	525	....	875	875
Chevrolet FB	Own.	4-3⅛x5¼	110	32x4	975	975	....	1575	1575
Cleveland 40	Own.	6-3 x4½	112	32x4	1295	1295	....	2195	2295
Climber Four K	H-S.	4-3½x5	115	33x4	1385	1385	....	....	....
Climber Six S	H-S.	6-3¼x5	125½	32x4½	2250	2250	....	3000	3100
Cole 890	Nort.	8-3½x4½	127¼	33x5	2485	†2485	2485	3385	3685
Columbia Challenger	Rut.	6-3½x5	115	32x4	....	1195	....	†1995	1995
Columbia D-C&CS	Cont.	6-3¼x4½	115	32x4	1475	1475	†1475	†2295	2350
Comet C-53	Cont.	6-3½x5¼	125	33x4½	....	2350	2450	....	3650
Commonwealth 44	H-S.	4-3½x5	117	32x4	....	1395	....	....	2465
Crawford 22-6-40	Cont.	6-3½x5¼	122½	32x4	3000	3000	3000	....	4500
Crow-Elkhart L63-65	Lyc.	4-3½x5	117	32x3½	†1295	1295	....	....	....
Crow-Elkhart S63-65	H-S.	6-3¼x5	117	33x4	†1545	1545	....	....	2395
Daniels D-19	Own.	8-3½x5¼	132	34x4¼	†5350	†5350	5350	6250	6950
Davis 61-67	Cont.	6-3¼x4½	120	33x4½	†1895	1795	†2050	2595	2595
Dixie Flyer H-S-70	H-S.	4-3½x5	112	32x4	1195	1195	†1395	1895	1895
Dodge Brothers	Own.	4-3⅞x4½	114	32x4	935	985	....	1585	1785
Dorris 6-80	Own.	6-4 x5	132	33x5	....	†4785	4785	5800	7190
Dort 19-11	D-Ly.	4-3½x5	108	31x4	985	985	....	1535	1685
Driggs	Own.	4-2⅝x4½	104	30x3½	1275	1275	....	....	1975
Duesenberg Straight 8	Own.	8-2⅞x5	134	33x5	6500	6500	6750	7800	7800
Du Pont A	Own.	4-3½x5½	124	32x4½	3400	†3400	....	4500	4900
Durant A-22	Own.	4-3⅞x4¼	109	31x4	....	890	....	1365	1365
Earl 40	Own.	4-3⅛x5¼	112	32x4	1375	1285	....	....	1995
Elcar K-4	Lyc.	4-3½x5	117	33x4	†1145	1145	†1145	1545	1645
Elcar 7-R	Cont.	6-3¼x4½	117	33x4	†1595	1595	†1595	2395	2495
Elgin K-1	Falls.	6-3½x4¼	118	33x4	1595	1495	†1595	2395	2395
Essex	Own.	4-3⅜x5	108½	32x4	1195	1195	....	1495	1995
Falcon 4	Own.	4-3½x5	115	32x4	1295	1295	....	1990	2085
Falcon 6	Own.	6-3½x5	115	32x4	1595	1595	....	2295	2395
Falcon 12-D22	Own.	4-2¾x4	100	27x3½	2800	†3000	....	....	4000
Fergus S-S-21	Own.	6-3¼x5	126	33x4½	....	Chassis	Price	10000	....
Ferris Series 60	Cont.	6-3½x5¼	130	32x4½	2695	....	*2595	....	3695
Ferris Series70	Cont.	6-3⅝x5¼	130	32x4½	2895	....	2795	....	3895
Ford T	Own.	4-3⅜x4	100	30x3½	**325	†1355	....	595	660
Franklin 9-B	Own	6-3¼x4	115	32x4	2300	2350	....	2650	3350
Gardner T-R & G	Lyc.	4-3½x5	112	32x3½	1095	1095	....	....	1695
Grant Special	Own.	6-3⅛x4½	116	32x4	1285	1285	....	1950	1950
H.C.S.	Weid.	4-3⅜x5½	120	32x4½	2725	†2775	....	3450	3650
Handley-Knight	Kn'ht.	4-4½x4½	125	32x4½	....	....	2850	4150	4150
Hanson Six 60	Cont.	6-3¼x4½	121	32x4	1795	1795	1995	†2775	2885
Hatfield A-42	H-S.	4-3½x5	115	32x4	†1495	1495	....	....	2395
Haynes 75	Own.	6-3½x5½	132	34x4½	2685	†2485	2485	....	3485
Haynes 55	Own.	6-3½x5	121	33x4	1835	1785	....	....	2835
Haynes 48	Own.	12-2¾x5	132	34x4½	4200	3635	3635	....	4950
Holmes Series 4	Own.	6-3½x4¼	126	34x4½	†2950	....	2950	3850	4150
Hudson Super 6	Own.	6-3½x5	126	34x4½	†1895	....	1895	2770	2895
Huffman R	Cont.	6-3¼x4½	120	32x4	1845	1795	....	....	2795
Hupmobile Series R	Own.	4-3¼x5½	112	32x4	1250	1250	....	2100	2150
Jackson 638	Cont.	6-3¼x4½	121	32x4½	†2285	1635	....	2985	2985
Jordan MX	Own.	6-3⅞x4¾	120	32x4	2095	2095	....	3200	3200
Jordan F	Cont.	6-3½x5¼	127	32x4½	....	....	2475	....	3500
Kenworthy 8-90	Own.	8-3 x5¼	13?	32x4½	5000	5000	5250	6000	6000
Kessler K	Own.	4-3⅜x3¾	117	32x4	....	1995	....	....	2445
King 8 J	Own.	8-3 x5	120	32x4½	2140	†2125	*2125	3125	3235
Kissel 45	Own.	6-3⅞x5½	124	32x4½	2975	†2975	2475	†3775	*3775
Kline Kar 6-55-K	Cont.	6-3¼x4½	121	33x4	1890	1890	1890	3050	3090
Kurtz Automatic A	H-S.	6-3¼x5	122	32x4	....	2050	....	....	3000
LaFayette 134	Own.	8-3¼x5¼	132	33x5	4850	4850	4850	6250	6500
Leach 999	Own.	6-3¼x5¼	134	32x4½	6500	6500	6500	6500	6500
Lexington Series S	Anst.	6-3¼x4½	122	32x4	....	2100	....	....	2785
Lexington Series T	Anst.	6-3¼x4½	128	32x4½	....	....	2785	....	3750
Liberty 10-C	Own.	6-3½x5	117	32x4	1595	1595	†1675	2400	2495
Lincoln	Own.	8-3⅜x5	136	33x5	†4600	4300	4300	4950	5400
Locomobile	Own.	6-4½x5½	142	35x5	....	†7600	7600	10500	11000
Maibohm B	Falls.	6-3½x4¼	116	32x4	1395	1395	†1595	2295	2295
Marmon 34	Own.	6-3¾x5½	136	32x4½	4185	†3985	3985	4875	5275

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Maxwell 25	Own.	4-3⅝x4½	109	31x4	$ 885	$ 885	....	$1385	$1485
McFarlan 1921	Own.	6-4½x6	140	33x5	6300	†6300	$6300	7500	7500
Mercer Series 5	Own.	4-3¾x6¾	132	32x4½	3950	†3950	*3950	4850	5250
Merit	Cont.	6-3¼x4½	119	32x4	†1985	1985	....	....	....
Meteor R & RR	Dues.	4-4½x6	129	32x4½	5500	5500	....	....	....
Mitchell F-50	Own.	6-3½x5	120	32x4	....	†1790	....	....	....
Mitchell F-50	Own.	6-3½x5	120	33x4	‡1490	1490	....	....	....
Mitchell F-50	Own.	6-3½x5	127	33x4	....	....	1795	....	....
Mitchell F-50	Own.	6-3½x5	120	33x4	....	....	....	2290	2440
Monroe S-9 & 10	Own.	4-3¼x4½	115	32x3½	1295	1295	....	....	....
Monroe S-11 & 12	Own.	4-3¼x4½	115	33x4	....	....	....	2075	2175
Moon 6-48	Cont.	6-3¼x4½	122	32x4	1785	1785	2285	2785	2785
Moon 6-68	Cont.	6-3½x5¼	125	32x4½	....	....	2285	....	....
Murray-Mac Six	Own.	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash 681-7	Own.	6-3¼x5	121	33x4	1525	1545	†1605	2395	2695
Nash 682	Own.	6-3¼x5	127	34x4½	....	....	1695	....	....
Nash Four 41-4	Own.	4-3⅝x5	112	33x4	1025	1045	....	1645	1835
National Sextet BB	Own.	6-3½x5¼	130	32x4½	2990	†2990	2990	4140	4240
Noma 1C	Cont.	6-3¼x4½	128	32x4½	2800	†2850	*3200	....	3700
Norwalk 430-KS	Lyc.	4-3½x5	116	32x3½	....	1035	....	....	....
Oakland 34-D	Own.	6-2¾x4¾	115	32x4	1095	1145	†1265	1625	1725
Ogren 6-T	Cont.	6-3½x5¼	134	33x5	†4250	4250	4375	5200	5500
Oldsmobile 43-A	Own.	4-3⅜x5¼	115	32x4	†1145	1145	....	1645	1845
Oldsmobile 37-A	Own.	6-2¾x4¾	112	32x4	†1450	1450	....	2145	2145
Oldsmobile 46	Own.	8-2⅞x4¾	122	33x4½	....	†1735	1735	....	2635
Oldsmobile 47	Own.	8-2⅞x4½	115	32x4	1625	†1625	....	2185	2425
Overland 4	Own.	4-3⅜x4	100	30x3½	595	595	....	850	895
Packard Single-Six	Own.	6-3⅜x4½	116	33x4½	2350	2350	....	3125	3350
Packard Twin Six	Own.	12-3 x5	136	35x5	4850	4850	4850	6600	6800
Paige 6-44	Own.	6-3¼x5	119	32x4	1635	1635	....	2450	2570
Paige 6-66	Cont.	6-3⅜x5	131	33x4½	†2975	†3295	2875	3755	3830
Pan American 6-55	H-S.	6-3¼x5	121	33x4	2000	2000	2100	....	....
Paterson 650	Cont.	6-3¾x4½	120	33x4	....	1595	1625	2695	2695
Peerless 56-S-7	Own.	8-3⅜x5	125	34x4½	....	†2880	2880	3500	3790
Piedmont 4-30	Lyc.	4-3½x5	116	32x3½	....	970	....	....	....
Piedmont 6-40	Cont.	6-3¾x4½	122	32x4	....	1285	....	....	....
Pierce-Arrow	Own.	6-4 x5½	138	33x5	7000	†6500	6500	8000	8500
Pilot 6-45	Teetor	6-3½x5	120	32x4	1945	1895	....	....	....
Pilot 6-50	H-S.	6-3¼x5	126	32x4½	2285	2285	2335	3350	3400
Porter 46	Own.	4-4 ⅛ x6⅜	142	35x5	6750	6750	6750	....	7800
Premier 6-D	Own.	6-3⅜x5½	126¾	33x5	3790	†3690	3890	4690	5190
Premocar 6-40 A	Falls.	6-3½x4¼	117	32x4	1295	1295	....	1945	1995
Raleigh A-6-60	H-S.	6-3¼x5	122	32x4½	2250	2250	....	3100	3200
R & V Knight R	Own.	4-3⅜x5	116	32x4	....	1850	....	2650	2750
R & V Knight J	Own.	6-3½x5½	127	32x4½	3350	†3350	3350	4000	4200
Reo Series ...B. T & U	Own.	6-3⅛x5	120	33x4	1650	....	1685	2700	2750
ReVere C	Dues.	4-4½x6	131	32x4½	4850	4650	†4650	....	6500
Roamer 6-54-E	Cont.	6-3½x5⅞	128	32x4½	2750	†2485	2750	†3950	3950
Roamer 4-75-E	Dues.	4-4¼x6	128	32x4½	3850	3650	....	....	†4750
Rolls-Royce	Own.	6-4½x4¾	143½	33x5	U. S.	Chassis	Price	†1750	....
Romer	Cont.	6-3¼x4½	120	33x4	1975	1975	2050	2400	2700
Saxon 125	Own.	4-3½x5	112	32x4	1295	1295	....	1995	1995
Sayers Six DP	Cont.	6-3¼x4½	118	33x4	1745	1745	....	2995	2995
Seneca L & O	LeR.	4-3½x4½	108	30x3½	1045	1045	....	....	....
Southern Six 660-2	H-S.	6-3¼x5	127	32x4½	2375	2375	2395	....	....
Sperling, A	Supr.	4-3⅝x5	114	32x4	980	980	....	1685	1685
Standard J	Own.	8-3¼x5	127	34x4½	3400	†3400	3400	4500	4800
Stanley Steamer	Own.	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six	Cont.	6-3¼x4½	118	33x4	2050	2050	....	2950	....
Stearns SKL4	Own.	4-3⅞x5⅝	125	34x4½	2450	2450	2675	3400	3700
Stephens 90	Own.	6-3¼x4½	122	33x4½	1800	†1850	*1850	2850	2850
Stevens-Duryea E	Own.	6-4⅞x5½	138	35x5	7250	†6900	6800	....	†8900
Studebaker EJ-40	Own.	6-3½x4½	112	32x4	1125	1150	....	1550	1850
Studebaker EH-50	Own.	6-3½x5	119	32x4	1585	1635	†1635	2450	2550
Studebaker EG-60	Own.	6-3⅞x5	126	33x4½	....	....	1985	2850	2950
Stutz	Own.	4-4⅜x6	130	32x4½	3250	†3350	*3350	4800	....
Templar A-445	Own.	4-3⅜x5½	118	32x4	1985	1985	....	2785	2785
Texan A-38	Lyc.	4-3½x5	115	33x4	1195	1195	....	....	....
Texan C-12	H-S.	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa E-1-2-3	H-S.	4-3½x5	117	33x4	1175	1175	....	....	....
Tulsa F-1	H-S.	6-3¼x5	119	33x4	1585	1585	....	....	....
Velie 48	Cont.	6-3¼x4½	115	32x4	1585	1585	†1800	2485	2485
Velie 34	Falls.	6-3¼x4½	112	32x3½	1235	1235	....	1750	2085
Vogue 6-55	H-S.	6-3¼x5	124	32x4	....	1885	1960	2785	2885
Vogue 6-66	Cont.	6-3½x5¼	124	33x4½	....	2085	2160	2885	2985
Waltham 6	Own.	6-3½x5	120	32x4	....	....	2350	....	....
Washington	Cont.	6-3¼x4½	116	32x4	....	1785	....	....	....
Washington Jr.	Cont.	6-3½x4¼	116	32x4	....	1635	....	....	....
Westcott C-48	Cont.	6-3½x5¼	125	32x4½	....	2090	2090	....	3490
Westcott C-38	Cont.	6-3¼x4½	118	33x4	1890	1890	†1990	2890	2890
Wharton A	Curt.	8-4 x5	136	34x4½	....	†4885	†4885	....	....
Wills Sainte Claire	Own.	8-3¼x4	121	32x4½	2875	2875	....	3750	4100
Willys-Knight 20	Own.	4-3⅝x4½	118	33x4	1475	1525	....	2195	2395
Winther 61	H-S.	6-3¼x5	120	32x4½	....	....	2250	....	....
Winton 25	Own.	6-3¾x5½	132	35x5	4600	†4975	4600	5950	†5950

*—6-passenger. †—4-passenger. ‡—3-passenger. **—Price without starter and demountable rims. Price with starter and demountable rims $420. ††—Price without starter and demountable rims. Price with starter and demountable rims $450.

Engine Make: Anst.—Ansted. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming Dues.—Duesenberg. H-S—Herschell-Spillman. LeR—Leroy. Lyc—Lycoming. Nort.—Northway. Roch—Rochester. Rut—Rutenberg. Weid—Weidely. Wisc—Wisconsin.

§Model 47—34 x 4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾	$1650§	3¾x5	34x5†	34x5†	W
Acason, R	1	2260	3¾x5¼	36x3½	36x5	W
Acason, RB	1½	2485	3¾x5¼	36x3½	36x6	W
Acason, H	2½	3295	4⅜x5¾	36x4*	36x8*	W
Acason, L	3½	4295	4⅜x5¾	36x5*	36x10*	W
Acason, M	5	5250	5 x6¼	36x6	40x12	W
Ace, C	1½	2295	3¾x5⅛	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2	....	4¼x5¼	36x4	36x7	W
Acme, AC	2½	....	4½x5½	36x4	36x7*	W
Acme, C	3½	....	4½x5½	36x5	40x10	W
Acme, E	5	....	4¾x6	36x6	40x12	W
Akr'nMulti-Trk20	1¼	1695	4 x5¼	34x5	34x5	B
American, 25	2½	3350	4 x6	36x4*	36x4d*	W
American, 40	4	4275	4½x6	36x5*	36x5d*	W
Apex, G	1	1450††	3½x5⅛	33x5†	33x5†	1
Apex, D	1½	1915	3¾x5⅛	34x3½	34x4	1
Apex, E	2½	2695	4¼x5½	36x4	36x7	1
Apex, F	3½	3975	4½x6	36x5	36x10	1
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6†	1
Atco, B1	1½	....	4¼x5½	36x4†	36x8*	W
Atco, A	2½	....	4¼x5½	32x4½†	32x4½†	W
Atlas, M.D.	1	1185	3½x5	34x3½	34x5	W
Atterbury, 20R	1½	2475	3¾x5	36x4	36x4d	W
Atterbury, 7CX	2½	3175	4⅛x5¼	36x5	40x5d	W
Atterbury, 7D	3½	3975	4½x5½	36x5	40x6d	W
Atterbury, 8E	5	4975	4¾x6	36x5	40x6d	W
Autocar, 21UF	1½–2	2300	4¾x4½	34x4*	34x5*	D
Autocar, 21UG	1½–2	2400	4¾x4½	34x4*	34x5*	D
Autocar, 26Y	....	4350	4½x5½	34x6	36x12	D
Autocar, 26-B	....	4500	4¼x5½	34x6	36x12	W
Available, H1½	1½	2175	4 x5⅛	36x3½*	36x5*	W
Available, H2	2	2775	4 x5⅛	36x3½*	36x6*	W
Available, H2½	2½	3475	4 x5⅛	36x4*	36x8*	W
Available, H3½	3½	4475	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Available, H7	7	6000	5 x6	36x6	40x14	B
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A Jr.	1	1950	3¾x5	34x3½	34x4	1
Beck, C	2	2550	4½x5½	36x4	36x6	1
Bell, M	1	1495	3⅝x5¼	35x5	35x5†	W
Bell, E	1½	2100	3¾x5¼	34x3½	34x5†	W
Bell, O	2½	2550	4½x5½	34x4	34x6	W
Belmont, D	2	2675	3¾x5	34x3½*	34x6*	D
Belmont, F	3½	3525	4 x6	36x5*	36x5d*	D
Bessemer, G	1	1395	3½x5	35x5†	35x5†	1
Bessemer, H-2	1½	1995	3¾x5	36x3½	36x5	1
Bessemer, J-2	2½	2595	4½x5¼	36x4	36x4d	1
Be semer, K-2	4	3495	4½x5½	36x5	36x10	W
Big 4, H	3½–4	5000	4½x6	36x6	36x6	W
Big 4, T	4	5500	4¾x6	36x6	36x6	W
Big 4, K	7	6000	5½x6	36x6	36x6	W
Big 4, HA	7	6000	4½x6	36x6	36x10	W
Brinton, C	1½	1500	3¾x5	34x4	34x5	W
Brinton, F	2½	2250	4⅝x5¼	35x5†	35x5†	W
Brockway, E	1	....	3¾x5⅛	36x3½*	36x5*	W
Brockway, S-4	1½	....	3¾x5	36x4	36x8	W
Brockway, K-5	2½	....	4½x5½	36x5	36x5d	W
Brockway, R-4	3½	....	4½x5½	36x6	40x6d	W
Brockway, T-4	5	....	4¾x6			
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Case, ††	2	3000	4¼x5¾	36x6	38x7	I
Champion Light Commercial	½	1195	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	745	3¼x4	31x4†	34x4½†	B
Chevrolet, T	1	1125	3¼x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5¼	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A-20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 18	¾	1890	3¾x5	34x5	34x5	W
Clydesdale, 32C	1	2375	3¾x5½	34x3½*	34x5*	W
Clydesdale, 42C	1½	2475	4 x5½	36x3½	36x5	W
Clydesdale, 65C	2½	3250	4¾x5½	36x4	36x7	W
Clydesdale, 65EC	2½	3450	4½x5½	36x4	36x7	W
Clydesdale, 90C	3½	4100	4½x5½	36x5	40x10	W
Clydesdale, 120C	5	4500	4¾x6	36x6	40x12	W
Collier, 18	1	2350	3¾x5	34x4	34x5	W
Collier, 19	1½	2550	3¾x5	36x4	36x6	W
Collier, 21	2	2950	4¼x5¼	36x4	36x7	W
Collier, 22	2½	3250	4¼x5¼	36x4	36x4	W
Columbia, H	1½	2350	3¾x5	35x5†	34x5	I
Columbia, G	2½	2850	4 x5¼	36x4	36x7	I
Comet T	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾–1¼	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Commerce, 18	2½	2495	4⅛x5¼	36x6†	36x7†	I
Concord, A	2	3150	4 x5½	36x3½	36x6	W
Concord, B	3	3600	4¼x5½	36x4	36x8	W
Concord, AX	2	3250	4 x5½	36x3½	36x6	W
Concord, BX	3	3600	4½x5½	36x4	36x8	W
Cook, 41	2	3000	4 x5½	36x6†	38x7†	I
Corbitt, H-22	1	$1480	3¾x5	34x3½	34x4	W
Corbitt, E-22	1½	2200	3¾x5	34x3½	34x4	W
Corbitt, C-22	2	2600	4¼x5¼	36x3½	36x6	W
Corbitt, B-22	2½	3000	4¼x5¼	36x4	36x7	W
Corbitt, R-22	3	3200	4½x5½	36x4	36x8	W
Corbitt, A-22	3½–4	3800	4½x5½	36x5	36x10	W
Corbitt, AA-22	5	4500	4¾x6	36x6	40x6d	W
Day-Elder, A	1	1600	3¾x5	34x3½	34x4	W
Day-Elder, B	1½	2000	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2400	4¼x5¼	36x4	36x7	W
Day-Elder, C	2½	2750	4½x5½	36x4	36x7	W
Day-Elder, F	3½	3150	4½x5½	36x5	36x5d	W
Day-Elder, E	5	4250	4½x6	36x5*	40x6d*	W
Dearborn, E	1	1700	3⅝x5⅛	35x5†	35x5†	W
Dearborn, FX	1½	2300	3¾x5⅛	34x4	34x5	W
Dearborn, F	1½	2180	3¾x5⅛	34x4*	34x5*	W
Dearborn, 48	2	2590	3¾x5⅛	35x5†	34x7†	W
Defiance, G	1	1695§	3¾x5	35x5†	35x5†	1
Defiance, D	1½	2095§	3¾x5	35x5†	36x6†	1
Defiance, E	2	2275§	3¾x5	35x5†	38x7†	1
DeMartini, 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini, 2	2	3300	4 x5½	36x3½	36x7	W
DeMartini 3	3	4250	4½x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 31	¾	1625	3½x5	35x5	35x5	B
Denby, 33	1½	2300	3¾x5	35x5†	38x7†	1
Denby, 34	2	2600	3¾x5	36x3½	36x6	1
Denby, 25	3	3300	4½x5¼	36x4	36x7	1
Denby, 27	4	4200	4½x5½	36x5	36x5d	1
Denby, 210	5	4850	4½x5½	36x5	40x6d	1
Dependable, A	¾–1	1650	3⅝x5½	34x5	36x6	W
Dependable, C	1½	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2	2650	4 x5¼	34x5	36x6	W
Dependable, E	2½	2950	4¼x5½	36x4	36x7	W
Dependable, G	3½	3550	4½x6	36x6	38x7	W
Diamond T, O	1–1¼	1975	3¾x5¼	36x3½†	36x4†	W
Diamond T, FS	1½	2525	3¾x5¼	36x3½	36x5	W
Diamond T, T	1½	2250	3¾x5¼	36x3½	36x5	W
Diamond T, U	2	2650	4 x5¼	36x4	36x7	W
Diamond T, K	3½	3750	4¼x5½	36x5	36x5d	W
Diamond T, EL	5	4325	4½x5½	36x6	40x6d	W
Diamond T, S	5	4500	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	1
Diehl, B	1½	....	3½x5	36x6	36x6	1
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	1
Doane	2½	4100††	4¼x5¾	36x5	36x7	C
Doane	3½	5100††	4⅝x5¾	36x5	36x5d	C
Doane	6	6000††	5 x6½	36x6	40x6d	C
Dodge Brothers	½	885	37⅝x4½	32x4†	32x4†	B
Dorris, K-4	2–2½	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	B
Dort, 103	½	685	3½x5	31x4	31x4	W
Double Drive B	3	4000	4¼x5½	6	6	W
Douglas G	1½	1850	3¾x5⅛	36x5	37x8*	W
Douglas I	3	2950	4¼x5½	36x6	37x8*	W
Duplex, A	1½	2775	4 x5¼	35x5†	38x7†	I
Duplex, E	3½	4250	4¼x5½	36x8	36x8	I
Duty, 21	2	1490	3½x5	34x3½	34x5	
Eagle, 100-2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, E	1½	....	3¾x5¼	36x6†	36x6†	W
Erie, A	2½	....	4¼x5½	36x4	36x4d	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Facto, 1921	2½	2295§	4¼x5½	36x4*	36x8*	W
Fageol, 1½	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, 2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol, 3½	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, 5	5	5700	4½x6¼	36x6	40x6d	W
Farge, R	2	1900	3¾x5	36x4	36x6	I
Federal, SD	1½	1800	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2175	4⅛x5¼	36x3½	36x5	W
Federal, UE	2	2425	4¼x5¼	36x4	36x7	W
Federal, WE	3½	3150	4½x5½	36x5	36x5d	W
Federal, X2	5–6	4550	4¾x6	36x6	40x6d	W
Ford, TT	1	445	3¾x4	30x3½*	32x4½*	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4¼x5¼	36x4	36x7	W
Forschler, BX	3	....	4¼x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
G & J** 20	1	2450	3⅝x5½	34x5†	34x5†	W
G & J** A	2	3850	4x5¼	36x4	36x7	W
G & J** B	3½	5175	4¼x5½	36x5	36x5d	W
G.M.C., K16	1	1495	3½x5½	34x5†	34x5†	B
G.M.C., K41 A	2	3000	4 x5¼	36x4*	36x7*	W
G.M.C., K71 A	3½	4250	4½x6	36x5	40x5d	W
G.M.C., K101A	5	4650	4½x6	36x5	40x6d	W
G.W.W.	1½	1950	3¾x5½	35x5	35x5	I
Garford, 15	¾	1590	3⅜x5½	34x5†	34x5†	W
Garford, 25	1¼	1990	3¾x5⅛	36x3½	36x4	W
Garford, 70-H	2	2750	4¼x5½	36x4	36x7	W
Garford, 77D	3½	$4300	4½x6	36x5	36x6d	W
Garford, 68D	5	5200	5 x6½	36x6	40x6d	W
Garford, 150-A	7½	5500	5x6½	36x6	40x7d	C
Gary, F	1	2100	3¾x5	36x3½	36x4	W
Gary, I	1½	2550	4 x5½	36x3½	36x5	W
Gary, J	2½	3150	4¼x5½	36x4	36x7	W
Gary, K	3½	4050	4½x6	36x5	40x5d	W
Gary, M	5	5150	5 x6½	36x6	40x6d	W
Gersix, M	1½	3100	4 x5½	36x3½	36x7	W
Gersix, K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Golden West, GH	3	4500	4½x6	36x7	36x7	W
Golden West, G	3½	5000	4½x5½	36x6	36x6	W
Graham Bros. A	1½	2495	3¾x5	35x5†	36x6†	1
Gramm-Bern., 10	1	1365§	3½x5	33x5†	33x5†	B
Gramm-Bern., 15	1½	2050§	3¾x5	36x3½*	36x5*	1
Gramm-Bern., 65	1½	2725§	3¾x5	36x3½*	36x5	W
Gramm-Bern., 20	2	3175§	4¼x5¼	36x4*	36x7*	W
Gramm-Bern., 25	2½	3575§	4¼x5½	36x4*	36x4d*	W
Gramm-Bern., 35	3½	4375§	4½x5½	36x5	40x5d*	W
Gramm-Bern., 50	5	5275§	4¾x6	36x6	40x6d*	W
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4¼x5¼	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10*	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal-Fur, E	1½	2350	4 x5½	34x5†	38x7†	W
Hal-Fur, B	2½	3000	4¼x5½	35x5*	38x7*	W
Hal-Fur, F	3½	4000	4½x5½	36x6†	40x10†	W
Hall, 1½	1½	3100	3¾x5	34x5†	38x7†	W
Hall, 2½	2½	3275	4⅛x5¼	36x4	36x6	W
Hall, 3½	3½	4100	4½x5½	36x5	36x5d	W
Hall, 5	5	5100	4½x5½	36x5	40x6d	W
Hall, 7 chain	7	5100	4½x5½	36x5	40x6d	C
Harvey, WEA	1½	2550	4¼x5½	34x3½	34x5	W
Harvey, WOA	2	2950	4½x5½	34x4	34x7	W
Harvey, WFA	2½	3300	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	3950	4½x6	36x5	36x5d	W
Harvey, WKA	5	4500	4½x6	36x6	40x6d	W
Hawkeye, K	1½	1850	3¾x5¼	34x3½*	34x5*	1
Hawkeye, M	2	2650	4¼x5½	36x4*	36x6*	1
Hawkeye, N	3½	3700	4½x6	36x5*	36x10*	W
Hendrickson, N	2½	3150	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3975	4¼x5¾	36x5*	36x5d*	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5½	34x3½	34x6	I
Hurlburt A	1½	2850	4 x5½	34x4	34x5	W
Hurlburt B	2½	3750	4¼x5½	36x4	36x4d	W
Hurlburt C	3½	4590	4½x6	36x5	36x5d	W
Hurlburt D	5	5500	4½x6	36x5	40x6d	W
Indep'd't(Iowa), B	1	1665	3½x5	34x3½	34x4	W
Indep'd't(Iowa), G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't(Ia.), H.1	2½	2940	4½x5¼	34x4	34x6	I
Indep d't(Ohio), F	1½	2385	3¾x5	36x3½	36x5	W
Indep'd't(Ohio), H	2½	3085	4¼x5¼	36x4	36x4d	W
Indep'd't(Ohio), K	3½	3985	4½x5½	36x5	36x5d	W
Indiana, 12	1½	....	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	....	4¼x5½	36x4*	36x7*	W
Indiana, 25	2½	....	4½x5½	30x4*	36x8*	W
Indiana, 35	3½	....	4⅝x5½	36x5*	36x5d*	W
Indiana, 51	5	....	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 21	1	1750	3½x5¼	36x3½	36x3½	I
International, 31	1½	1850	3½x5¼	36x3½	36x4	I
International, 41	2	2100	3½x5¼	36x3½	36x5	I
International, 61	3	2400	4½x5	36x4	36x6	I
International, 101	5	3600	4½x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	3850	4½x5½	36x7	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	4½x5½	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4½x6	38x7†	44x10	I
K-Z, 1	1	1750	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2075	3⅝x5	36x4	36x6	W
K-Z, 2½	2½	2550	4¼x5½	36x4	36x8	W
K-Z, 3½	3½	3350	4½x5½	36x5	40x10	W
K-Z, 5	5	3850	4½x5½	36x6	40x6d	W
Kalamazoo, G-1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G-2	1½	2800§	3¾x5	36x5	36x6	W
Kalamazoo, H	2½	3275§	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4000§	4¼x6	36x5	36x10	W
Kalamazoo K-5	5	4500§	4½x6	36x6	36x6d	W
Karavan, A	2½	3900	4¼x6	36x4	36x8	W
Kearns, H	1	1600	3¼x4½	32x4½†	32x4½†	I
Kearns, N	2	2200	3½x5	34x3½	34x6	I
[1]Kelly-S., K-31	1½	2900	3¾x5¼	36x3½	36x6	C
[1]Kelly-S., K-34	1½	2900	3¾x5¼	36x3½	36x6	W
[1]Kelly-S., K-38	2½	3250	3¾x5¼	36x4	36x4d	W
[1]Kelly-S., K-35	2½	3250	3¾x5¼	36x4	36x4d	C
[1]Kelly-S., K-40	3½	4200	4½x6½	36x5	40x5d	C
[1]Kelly-S., K-41	3½	4200	4½x6½	36x5	40x5d	I
[1]Kelly-S., K-42	3½	4200	4½x6½	36x5	40x5d	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

1—Kelly-Springfield.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
[1]Kelly-S., K-45	4	$4550	4½x6½	36x5	40x6d	C
[1]Kelly-S., K-50	5	4900	4½x6½	36x6	40x6d	C
[1]Kelly-S., K-60	6	5100	4½x6½	36x6	40x7d	C
Keystone, 40	2	2450	3¾x5½	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W
Kimball, AC	2½	3975	4¼x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4½x6	36x4	36x10	W
Kimball, AF	5	5800	4¾x6	36x5	40x12	W
Kissel, Express	1	1985††	5 x6	36x6	40x7d	W
Kissel, Utility	1½	1975	3½x5½	34x5†	34x5†	W
Kissel, Freighter	2½	2875	3½x5½	36x3½	36x5	W
Kissel, H. D.	4	3675	4¼x5½	36x4	36x7	W
Kleiber, AA	1	2600	4¼x5½	36x5	36x5d	W
Kleiber, A	1½	3100	4½x5¼	34x3½*	34x5*	W
Kleiber, BB	2	3600	4½x5¼	36x3½*	36x6*	W
Kleiber, B	2½	3950	4½x5¼	36x4*	36x7*	W
Kleiber, C	3½	4600	4½x5½	36x5*	36x8	W
Kleiber, D	5	5300	4½x5½	36x5	36x5d	W
Koehler, D	1½	1995	5 x6½	36x6	40x12	W
Koehler, M	2½	3175	3½x5	34x3½	34x5	W
Koehler, MCS	2½	3275	4 x5½	36x4	36x7	W
Koehler, F	3½	4150	4 x5½	36x4	36x7	W
Koehler,MT, Trac	5	3275	4 x5⅞	36x4	36x7	W
Lange, B	2½	3350	4½x5¼	36x4*	36x7*	C
Larrabee, X-Z	1	1925	3¼x4½	34x5†	34x5†	B
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee, K	2½	3200	4½x5¼	36x4	36x7	W
Larrabee, L-4	3½	4000	4½x5½	36x5	36x5d	W
Larrabee, W	5	4800	4¾x6	36x6	40x6d	W
Luedinghaus, C	1	1695	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2490	3¾x5¼	34x3½*	34x5*	W
Luedinghaus, K	2-2½	3150	4¼x5¾	36x4*	36x7*	W
Maccar, L	1½	2700	4½x5¼	36x4	36x6	W
Maccar, H-A	2	3100	4½x5¼	36x4	36x4d	W
Maccar, H-2	3	3400	4½x5½	36x4	36x4d	W
Maccar, M-2	4	4200	4½x6	36x5	36x5d	W
Maccar, G	5-6	4950	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	2600	4 x5	36x4	36x31/2d	D
Mack, AB	2½	3400	4 x5	36x4	36x4d	C
Mack, AB Chain	1½	3000	4 x5	36x4	36x31/2d	C
Mack, AB Chain	2	3300	4 x5	36x4	36x31/2d	C
Mack, AB D.R.	2	3300	4 x5	36x4	36x4d	C
Mack, AC Chain	3½	3750	4 x5	36x4	36x4d	D
Mack, AC Chain	5	4950	5 x6	36x5	40x5d	C
Mcck, AC Chain	6½	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	7½	5750	5 x6	36x6	40x12	C
Mack Trac, AB	5	6000	5 x6	36x7	40x7d	C
Mack Trac., AC	7	3400	4 x5	36x4	36x4d	C
Mack Trac. AC	10	4950	5 x6	36x5	40x5d	C
Mack Trac., AC	13	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	15	5750	5 x6	36x6	40x12	C
Mapleleaf, AA**	2	6000	5 x6	36x7	40x7d	C
Mapleleaf, BB**	3	4150	4 x5½	36x4	36x7	W
Mapleleaf, CC**	4	4775	4¼x5½	36x4	36x4d	W
Mapleleaf, DD**	5	5770	4½x5½	36x5	36x5d	W
Master, JW	1½	6490	4½x5½	36x6	40x6d	W
Master, W	2½	2690	4½x5½	34x3½	34x5	W
Master, D	2½	3290	4¼x5½	34x4	36x7	W
Master, A	3½	3540	4¼x5½	34x4	36x7	D
Master, E	3½	4190	4½x6	36x5	40x5d	W
Master, B	5	4610	4½x6	36x5	40x5d	D
Master, F	5	5290	4¾x6½	36x6	40x6d	W
Master Trac., T	6	5440	4¾x6½	36x6	40x6d	D
Maxwell, 1½	1½	3740	4¼x5½	34x4	36x7	D
Menominee, HT	1	1332	3⅝x4¼	32x3	32x4	W
Menominee, H	1½	2080	3¾x5	34x3½	36x5	W
Menominee, D	2	2725	4 x5	36x3½	36x5	W
Menominee, G	3½	3245	4 x6	36x4	36x8	W
Menominee, J-3	5	4270	4½x6	36x5	36x10	W
Moline, 10	1½	5150	4¾x6	36x6	40x12	W
Moreland, 21B	1½	1985	3½x5	34x5†	36x6†	I
Moreland, 21C	2½	2800	4¼x5¼	36x3½	36x6	W
Moreland, 21H	3½	3500	4½x5½	36x4	36x8	W
Moreland, 21J	5	4600	4¾x6	36x5	40x5d	W
		5000	4¾x6	36x6	40x6d	W
Napoleon, 7	¾	1350	3½x5	38x4	33x4†	I
Napoleon, 9	1	1535	3½x5	35x5*	35x5*	I
Nash, 2018	1	1860	3½x5	35x5*	36x6*	I
Nash, 3018	1	1895	3¾x5½	35x5	36x6	I
Nash, Quad.	2	2550	3¾x5½	36x6	40x8	I
Nash, 5018	2	3250	4¼x5½	40x8	40x8	I
[2]Nelson, F1½	2½	2550	3¾x5¼	34x4	34x6	I
[2]Nelson, F2	1½	....	4½x5¼	36x3½	36x5	W
[2]Nelson, F3½	2	....	4½x5¼	36x4	36x7	W
[2]Nelson, FC5	3½	....	4½x5½	36x5	36x5d	W
Netco, D	5	....	4¾x6	36x6	40x6d	W
Netco, H	2	3100	4¼x5¼	36x4*	36x7*	W
New York, M	2½	3500	4½x5½	36x4*	36x8*	W
New York, N	1½	....	4½x5½	36x3½	36x5	W
Niles, E	2-2½	....	4½x5¼	36x4	36x4d	W
Noble, B30	2	3000	4½x5¼	36x4*	36x7*	W
Noble, C40	2½	2100	3¾x5¼	36x3½	36x5	W
Noble, D50	2½	2675	4 x5½	36x4	36x7	W
Noble, E70	3½	2950	4¼x5½	36x4	36x8	W
Northway, B-2	2	3800	4½x6	36x5	36x10	W
Northway, B-3	3½	3400	4 x6	36x4	36x4d	W
NorthwesternW	1½	4400	4 x6	36x5	40x5d	W
Northwestern WS	2½	2700	4¼x5¼	34x4	36x6	W
Norwalk, 25E	1	3500	4½x5½	36x4	36x8	W
Norwalk, 35E	1½	1695	3½x5	34x3½	34x4	W
Norwalk,35E.Spec	1½	2025	3½x5	34x3½	34x3½d	W
		2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	$2675	4 x5½	36x3½	36x5	W
O. K., L1	2½	3450	4½x5½	36x4	36x8	W
O. K., M1	3½	4250	4½x6	36x5	36x5d	W
Ogden, A1	1½	2375	3¾x5	36x3½	36x5	W
Ogden, E	2½	2975	4¼x5¼	36x4	36x7	W
Old Hickory, W	1	2175	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
OldReliable,KLM	7	6000	4¾x6¼	36x6	40x7d	C
Oldsmobile Econ.	1	1095	3⅛x5¼	35x5†	35x5†	I
Olympic, A	2½	3500	4¼x5½	36x4	36x7	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5⅛	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5⅛	38x7†	38x7†	4
Packard, EC	1½-3	3500	4½x5½	36x4	36x7	W
Packard, EX	1½-3	4000	4½x5½	36x6†	40x8†	W
Packard, ED	2-4½	4100	4½x5½	36x5	36x5d	W
Packard, EF	4-7½	4500	5 x5½	36x6	40x6d	W
Paige, 52-19	1½	2880	4 x5¼	34x3½	34x5	W
Paige, 54-20	2½	3400	4¼x5½	34x4	34x8	W
Paige, 51-18	3½	4285	4½x5½	36x5	36x5d	W
Parker, F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	1	1500	3¾x5	35x5†	35x5†	W
Patriot, Lincoln	2	2050	4 5¼	34x3½	34x5	W
Patriot, Washgt'n	3	2900	4½x5½	36x4	36x7	W
Piedmont, 4-30	1	1200	3½x5	34x4†	34x4†	W
Pierce-Arrow	2	3200	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4350	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	4850	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1550	3¾x4¼	32x4½†	32x4½†	W
Pittsburger, C-21	3	3800	4½x5¼	36x5*	36x7*	W
Power, F	2	3400	3¾x5¼	36x6	36x6	W
Power, C	3½	4500	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-21	¾	1990	3½x5	35x5†	35x5†	W
Rainier, R-19	1	2150	3½x5	34x3½	31x4	W
Rainier, R-16	1½	2490	3¾x5	34x3½	34x5	W
Rainier, R-18	2	2890	4½x5¼	34x4	34x6	W
Rainier, R-20	2½	3550	4½x5¼	34x4	34x7	W
Rainier, R-15	3½	4400	4½x5½	36x5	36x5d	W
Rainier, R-17	5	5100	4½x6	36x6	36x6d	W
Ranger, TK-22-2	2	2775	3¾x5	36x6†	38x7†	W
Reo, F	¾-1¼	1245	4½x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2400	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3100	4¼x5½	36x4	36x4d	I
Republic, 75	¾	1395††	3½x5	32x4½	32x4½	I
Republic, 10	1	1395	3¾x5	35x5†	35x5†	I
Republic,10Exp.	1	1695	3¾x5	35x5†	35x5†	I
Republic, 11X	1½	1795	3¾x5	34x3½	34x5	I
Republic, 19	2½	2155	4½x5¼	36x4	36x7	I
Republic, 20	3½	3095	4½x5½	36x5	36x10	I
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3¼x5‡	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Sandow, G	1	2295	3¾x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4½x5½	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	3350	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	4200	4½x5½	36x5	36x5d	W
Sanford, 50	5	5100	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	....	4¼x5½	36x4	36x7	W
Schacht, 2½-Ton	2½	....	4¼x5½	36x4	36x4d	W
Schacht, 3½-Ton	3½	....	4¼x6	36x5	36x5d	W
Schacht, 5-Ton	5	....	4½x6	36x5	40x6d	W
Schwartz, A	1	1615	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2690	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 1½A	1½	2360	3¾x5	34x3½	34x5	W
Selden, 2½A	2½	3425	4¼x5¼	36x4	36x7	W
Selden, 3½A	3½	4175	4½x5½	36x5	36x10	W
Selden, 5A	5	5600	4¾x6	36x6	40x12	W
Seneca, M	½	1020	3½x4½	30x3½†	30x3½†	B
Service, 15	¾-1	1840	3⅜x5	34x4½	35x5	B
Service, 220	1	2415	3½x5¼	34x4½	34x5	W
Service, 31	1½	2985	4 x5½	36x3½	36x6	W
Service, 36	1½	3415	4¼x5½	35x5†	38x7†	W
Service, 51	2½	3475	4¼x5½	36x4	36x7	W
Service, 71	3½	4285	4½x5½	36x5	36x5d	W
Service, 76	3½	4485	4½x6	36x5	36x5d	W
Service, 101	5	5275	4½x6	36x6	40x6d	W
Signal, NF	1	1950	4¾x5	34x5†	36x6†	W
Signal, H	1½	2450	4¼x5¼	34x4	36x6	W
Signal, J	2½	2875	4¼x5¼	34x4	36x8	W
Signal, M	3½	3675	4½x5½	36x5	40x5d	W
Signal, R	5	$4400	4¾x6	36x6	40x6d	W
Southern, 10	1	2090	3¾x5	34x3½	34x4	W
Southern, 15	1½	2590	3¾x5⅛	36x6†	34x4	W
Southern, 20	2	2990	4¾x5¼	36x6†	40x8*	W
Standard, 1-K	1-1½	1600	3¾x5	34x3½*	34x5*	W
Standard, 76	2½-3	2400	4½x5¼	36x4*	36x7*	W
Standard, 66	3½-4	3150	4½x5½	36x5	36x10	W
Standard, 5-K	5-7	4400	4¾x6	36x6	40x12	W
Sterling, 1½	1½	2885	4 x5¾	36x3½	36x5*	W
Sterling, 2	2	3085	4 x5¾	36x4	36x6	W
Sterling, 2½	2½	3290	4¾x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4325	4½x6¼	36x5*	40x5d*	W
Sterling, 5-W	5	4950	5 x6¼	36x6*	40x6d*	W
Sterling, 5-C	5	5500	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6000	5 x6¼	36x6	40x7d	C
Stewart, 14	¾	1395	3⅝x5⅛	32x4½†	32x4½†	I
Stewart, 15	1	1875	3⅝x5⅛	35x5†	35x5†	I
Stewart, 9	1½	2200	3¾x5	34x3½	34x5	I
Stewart, 7	2	2800	4½x5¼	34x4	34x7	I
Stewart, 7-X	2½	2950	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3850	4½x5½	36x5	36x5d	I
Stewart, 10-X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, C	¾	1240	3½x5	34x4½†	34x4½†	W
Stoughton, A	1	1995	3¾x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5⅛	36x4	36x7	W
Stoughton, F	3	3600	4¼x5½	36x5d	36x5d	W
Sullivan, E	2	3350	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	4650	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4½x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck, 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
Tiffin, GW	1½	2400	4½x5¼	36x3½	36x5	W
Tiffin, MW	2½	3100	4½x5¼	36x4	36x3½d	W
Tiffin, PW	3½	4100	4½x5½	36x5	40x5d	W
Tiffin, F50	5	4800	4¾x6	36x6	40x6d	W
Tiffin, F60	6	5000	4¾x6	36x6	40x12	W
Titan, HT	3½	4550	4½x6	34x4*	40x5d	I
Titan, HD	5	5400	4½x6	36x5	40x6d	I
Titan, TS	2½	3400	4¼x5½	34x4*	36x4d	I
Tower, J	1½	2900	4½x5¼	35x5	38x7	W
Tower, H	2½	3200	4½x5¼	36x4	36x7	W
Tower, G	3½	4100	4½x5½	36x5	36x5d	W
Traffic, C	....	1595	3¾x5	34x3½*	34x5*	I
Traffic	3	1895	3¾x5	36x4	36x7	I
Transport, 20	1	1395	3¾x5⅛	34x3½	34x4	I
Transport, 30	1½	1995	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	3885	4½x6	36x5	36x10	I
Traylor, B	1½	2390	3¾x5⅛	34x3½	34x5	W
Traylor, C	2	2850	4 x5½	36x4	36x7	W
Traylor, D	3	3300	4¼x5½	36x4	36x8*	W
Traylor, E	4	4450	4½x6	35x5	40x10	W
Traylor, F	5	4700	4½x6	36x6	40x6d	W
Triangle, AA	¾-1	1385	3¼x5	34x4½†	34x4½†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, G	1	1995	3⅝x5⅛	34x5†	34x5†	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Twin City, B.W.	2	2750	4 x5½	36x4	36x7	I
Twin City, A.W.	3½	4000	4¼x6	36x5	40x5d	W
[3]Twin City, B	3½	....	5⅛x6	36x6	36x6	I
[3]Twin City, A	5	....	5⅛x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½*	36x6*	W
Ultimate, AJ	2	3250	4¼x5½	35x5†	38x7†	W
Ultimate, AJL	2	3300	4½x5½	36x3½	36x6	W
Ultimate, B	3	3750	4¼x5½	36x4*	36x4d*	W
Ultimate, BL	3	3850	4¼x5½	36x4*	36x4d*	W
Union, FW	2½	3490	4 x6	36x5*	36x8*	D
Union, HW	4	4485	4½x6	36x6	40x12	D
Union, JW	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5¼	36x3½*	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	5000	4½x6	36x6	40x6d	I
United States, N	1½	1975	3¾x5	36x3½*	36x5*	I
United States, R	3	3075	4 x5¼	36x4	36x4d	W
United States, S	4	3875	4½x5½	36x5	36x5d	W
United States, T	6	4850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	1585	3¾x5	36x3½	36x5	I
Veteran, E**	1-1½	3500	3¾x5¼	35x5†	36x6†	W
Veteran, A**	2-2½	4000	4¼x5½	36x4*	36x7*	W
Veteran, D**	2½-3	4400	4¼x5½	36x4*	36x7*	W
Veteran, H**	3½-4	5600	4¼x6	36x5	36x5d	W
Vim, 29	½	1050	3⅛x4½	31x4†	31x4†	W
Vim, 30	½	1175	3⅛x4½	32x4½	32x4½	W
Vim, 31	1	1975	3¾x5½	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4500	4¼x6	36x6	40x8	W
Walker-JohnsonA	1½-2	2750	3¾x5	34x5	38x7	W
Walker-Johnson,B	3	3500	4¼x5½	36x4	36x8	W
Walter, S	5	4850	4½x6¼	36x6	40x6d	W
Ward-LaF., 2B	2½	3590	4¾x5¾	36x4	36x7	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

[1]—Kelly-Springfield. [2]—Nelson Le Moon. [3]—Twin City Four Wheel Drive.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Ward-LaF., 4A	3½	$4690	4½x6¼	36x5	36x5d	W
Ward-LaF., 5A	5	5590	5 x6¼	36x6	40x6d	W
Watson, E	1	1785	3¾x5¼	35x5†	35x5†	W
Watson, N	3½	3825	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4½x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4½x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5½	34x5†	34x5†	B
White, 20	2	3250	3¾x5½	36x4*	36x7	D
White, 40	3½	4200	3¾x5¾	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	1225	3¾x5	34x5†	34x5†	W
White Hick., H	1½	1375	3¾x5	36x3½	36x5	W
White Hick., K	2½	1675	4½x5¼	36x4	36x5	W
Wichita, K	1	2300	3¾x5¼	36x3*	36x4*	W
Wichita, L	1½	2600	3¾x5¼	36x3½*	36x5*	W
Wichita, M	2	2800	3¾x5¼	36x3½*	36x6*	W
Wichita, R	2½	3000	3¾x5¼	36x4*	36x7*	W
Wichita, RX	2½	$3600	4¼x6	36x4*	36x8*	W
Wichita, O	3½	4000	4¼x6	36x5*	36x5d*	W
Wichita, S	5	5000	4½x6	36x6	40x6d	W
Wilcox, AA	1	1900	3¾x5½	36x4*	36x4*	W
Wilcox, BB	1½	2550	4¼x5	36x4	36x5	W
Wilcox, D	2½	3000	4¼x5	36x4*	36x3½d*	W
Wilcox, E	3½	3950	4½x6	36x5*	36x5d*	W
Wilcox, F	5	4350	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¾x5	36x3½	36x5	W
Wilson, EA	2½	2825	4½x5¼	36x4	36x7	W
Wilson, G	3½	3685	4½x5½	36x5	36x5d	W
Wilson, H	5	4520	4¾x6	36x6	40x6d	W
Winther, 751	1	$1795	3½x5	34x4½†	35x5†	I
Winther, 430	1½	2850	3¾x5	32x4	32x4	I
Winther, 39	1½	2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4d	I
Winther, 50	2½	3995	4 x6	38x7†	42x9†	I
Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Winther, 450	2½	3690	4 x5	34x5	36x6	I
Winther, 109	5	5250	4½x6	36x6	40x5d	I
Winther, 140	7	5900	5 x6	36x6	40x7d	I
Wisconsin, B	1	1950	4 x5¾	34x5†	34x5†	W
Wisconsin, C	1½	2500	4¾x5¾	36x6†	36x6†	W
Wisconsin, D	2½	3500	4½x6¼	36x6	36x10	W
Wisconsin, E	3½	4000	5 x6¼	36x6†	36x12†	W
Witt-Will, N	1½	2750	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	3250	4¼x5¼	36x3½*	36x7*	W
Wolverine, J	1	2125	3½x5	34x3	34x4	I
Wolverine, J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine, J	2	2640	3¾x5	34x4	34x7	I
Wolverine, J	2½	3425	4½x5¼	36x5	36x10	I
Wolverine, L	3½	4100	4½x5½	36x5	36x10	I

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††Price includes body. §—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	16-30	$1975	3	Clim.	4-5 x6½	GDK	3-4
Allis-Chalm. B	6-12	925	2	LeR.	4-3½x4½	Gas.	1
Allis-Chal.G.P	6-12	795	2	LeR.	4-3½x4½	Gas.	1-2
Allis-Chalm.	12-20	1350	2	Midw.	4-4½x5¼	Gas.	2-3
Allis-Chalm.	18-30	2150	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm.	10-18	875	4	Own	4-4¾x6½	G,K	4
Allwork 2-G	14-28	1775	4	Own	4-4¾x6	GorK	3
Allwork C	14-28	1525	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Appleton	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
ARO 1921-22	3-5	495	4	Own	1-4½x5	Gas.	1
Aultman-T,	15-30	2200	4	Clim.	4-5 x6½	G,K	4
Aultman-T,	22-45	3420	4	Own	4-5½x8	G,K	6
Aultman-T,	30-60	4500	4	Own	4-7 x9	G,K,D	8
Automot, B-3	12-24	1785	4	Here.	4-4 x5	Gas.	2-3
Avery,SR.Cul	5-10	....	4	Own	4-3 x4	G,K	..
Avery Cult-C	.....	....	3	Own	6-3 x4	G,K	..
Avery B	5-10	....	4	Own	4-3 x4	G,K	2
Avery C	.....	....	4	Own	6-3 x4	G,K	..
Avery	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery	12-20	....	4	Own	4-4¾x6	G,K,D	2-3
Avery	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery	14-28	....	4	Own	4-4½x7	G,K,D	3-4
Avery	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery	25-50	....	4	Own	4-6½x7	G,K,D	5-6
Avery	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule H	15-25	....	4	Midw	4-4½x5¼	Gas.	3
Bates Mule, F	18-25	....	*2	Midw	4-4½x5¼	Gas.	3
Bates Mule, G	25-35	....	*2	Midw	4-4½x6	Gas.	com.
Beeman, G	2-4	315	4	Own	1-3½x4½	Gas.	....
Best	30	3100	*2	Own	4-4¾x6½	G,K,D	4
Best	60	5450	*2	Own	4-6½x8½	G,K,D	8-9
Boring 1921	.....	1850	3	Wauk	4-4¾x5¾	GorK	2
Burn-Oil, 1922	15-30	1495	4	Own	2-6¾x7	Ker.	3-4
Capital	15-30	1000	2	Own	4-4¾x6	Gas.	3
Case	10-18	800	4	Own	4-3½x5	GorK	2
Case	15-27	1680	4	Own	4-4½x6	GorK	3
Case	22-40	3100	4	Own	4-5½x6¾	GorK	4-5
Caterpillar T11	25	3975	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	6050	*2	Own	4-6½x7	Gas.	6
Centaur	5-2½	385	2	N Way	2-4½x4½	GorK	1
Chase	12-25	1725	3	Buda	4-4½x5½	GorK	2-3
Chicago 40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac F	9-16	845	*2	Own	4-3½x4½	G,K,D	2
Cletrac W	12-20	1495	*2	Own	4-4 x5½	G,K,D	2-3
Dakota 4	15-27	1500	3	Dom,	4-4¾x6	Gas.	3
Dart B.J.	15-30	1800	4	Buda	4-4½x6	Gas.	3-4
Depue A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill D	20	2380	4	Cont.	4-4½x5½	Gas.	3
Dill R.W.	20	2980	4	Midw.	4-4½x6	Gas.	3
Do-It-All A	3-6	595	..	Own	1-4½x5	Gas.	1
Eagle F	12-22	....	4	Own	2-7 x8	GorK	3-4
Eagle F	16-30	....	4	Own	2-8 x8	GorK	4-5
E-B AA	12-20	1445	4	Own	4-4¾x5	G,K,D	3
E-B Q	12-20	925	4	Own	4-4¾x5	G,K,D	3
E-B	16-32	2080	4	Own	4-5¼x7	G,K,D	4
Evans	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse B	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4
Farquhar	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch 4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City	40-70	....	4	Own	4-7½x9	Ker.	8-10
Fordson	.....	625	4	Own	4-4x5	G,K	2
Fox E	20-40	3100	4	Own	4-5½x7½	G or K	4
Franklin G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-4
Franklin C	18-30	3350	*2	Clim.	4-5 x6½	G or K	3-4
Franklin G2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
Grain Belt A	18-36	$2150	4	Wauk.	4-4¾x6¾	G or K	4
Gray 1920	18-36	2000	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog	19-31	2000	4	Erd.	4-4 x6	G or K	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K	4
Harj-Parr 20	20	945	4	Own	2-5¼x6½	K,D.	2
Hart-Parr 30	30	1295	4	Own	2-6½x7	K,D.	3
Heider D	9-16	1170	4	Wauk	4-4¼x5¾	G,K	2
Heider C	12-20	1395	4	Wauk	4-4½x6¾	G,K	3
Heider Cult	6-10	1050	4	LeR.	4-3½x4½	Gas.	1
Hicks	20-30	....	4	....	4-4½x6	K or G	4
Huber Light 4	12-25	1185	4	Wauk	4-4½x5¾	G or K	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas	3
Illinois, Super-Drive C	18-30	....	4	Clim.	4-5 x6½	G,K	4
Imperial E	40-70	4500	4	Own	4-7½x9	G,K,D	10
Indiana F	5-10	895	2	LeR.	4-3½x4½	Gas.	1-2
International	8-16	900	4	Own	4-4¼x5	G,K,D	2
International	15-30	1750	4	Own	-5¼x8	G,K,D	4
J-T N	20-40	....	*2	Chief.	4-4¾x6	G,K,D	3-4
Klumb F	16-32	1475	4	Clim.	4-5 x6½	....	..
Knudsen 1920	25-45	2500	4	Own	4-5 x9	Gas	4-6
LaCrosse M	6-12	650	4	Own	2-4 x6	G,K	1
LaCrosse G	12-24	985	4	Own	2-6 x7	G or K	3
Lauson 5	12-25	1495	4	Midw.	4-4½x5¼	Gas.	3
Lauson 20	15-25	1685	4	Beav.	4-4½x6	G or K	3-4
Lauson 21	15-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Lauson Road	15-30	2225	4	Beav.	4-4¾x6	K	....
Leader B	12-18	1095	4	Own	2-6 x6¼	G,K,D	2-3
Leader N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4
Leader GU	18-35	2775	*2	Clim.	4-5 x6½	G,K	3-4
Leonard E	20-30	2530	4	Buda	4-4½x6	G,K	3
Linn H4J	40-	4500	*	Cont.	4-4½x5½	Gas	4
Linn W	60	5100	*	Wauk	4-5 x6¼	Gas	6
Little Giant, B	16-22	2200	4	Own	4-4½x5	K	4
Little Giant, A	26-35	3300	4	Own	4-5½x6	K	6
Lombard 1921	85-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard 1921	50	....	*2	....	4-4¾x6½	....	6-10
Magnet B	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr.	5-10	585	..	LeR.	-2¾x4	Gas.	1
MerryGar1921	2	230	2	Evin	1-2½x2½	Gas.	..
Minne All-P	12-25	900	4	Own	4-4½x7	G or K	3
Minne. Gen.P	17-30	1675	4	Own	4-4¾x7	G or K	3-4
Minne. Med.Duty	22-44	3000	4	Own	4-6 x7	G or K	5-6
Minne. HeavyDuty	35-70	4150	4	Own	4-7½x9	G or K	8-9
Mohawk 1921	8-16	785	2	Light	4-3¼x4½	K or G	1-2
Moline Univ D	9-18	990	2	Own	4-3½x5	Gas.	2-3
Moline Orch	9-18	1075	2	Own	4-3½x5	Gas.	2-3
Motor Macult	1½	195	2	Own	1-2¾x3½	Gas.	..
Motox	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB 1	3-6	425	4	Own	2-3¾x4	Gas.	1
Nichols-Shep. 20-42	20-42	3100	4	Own	8 x10	G or K	3-6
Nichols Shep. 25-50	25-50	3460	4	Own	9 x12	G or K	4-7
Nilson Senior	20-40	2475	5	Wauk	4-5 x6¼	G,K	4
Oil Pull K	12-20	1485	4	Own	2-6 x8	K,D	3
Oil Pull H	16-30	2285	4	Own	2-7 x8½	K,D	4
Oil Pull G	20-40	3175	4	Own	2-8 x10	K,D	5-6
Oil Pull E	30-60	4590	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	395	4	Own	1-5½x5½	Gas.	1
Oliver A	15-20	....	*2	Beav.	4-4½x6	G or K	3-4
Once Over Tiller Mask 6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Parrett K	15-30	1950	4	Pitt	4-4½x6	G,K	3
Peoria L	12-25	1600	4	Clim.	4-5 x6½	G,K	3
Pioneer G	18-36	....	4	Own	4-5½x6	G,K,D	4
Pioneer C	30-60	....	4	Own	4-7 x8	Gas.	10
Plowman A	15-30	1695	4	Buda	4-4½x6	G,K	3-4
Port Huron A	12-25	$1500	4	Chief	4-3¾x6	G,K	3
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reed A	15-30	1985	4	Wauk	4-4½x6¼	G or K	3-4
Reed A-1	18-36	2185	4	Wauk	4-5 x6½	Gas.	4
Reliable	10-20	885	4	Own	2-6 x7	Ker.	2
Rex	12-25	1600	4	Wauk	4-4¼x5¾	G or K	3
Russell	12-24	1500	4	Own	4-4¼x5¾	G or K	2-3
Russell	15-30	2200	4	Own	4-5 x6½	G or K	3-4
Russell	20-35	3000	4	Own	4-5½x7	G or K	4-5
Russell	30-60	5000	4	Own	4-8 x10	G or K	8-10
Samson M	..	....	4	Nor	4-4 x5½	G,K	2
Sandusky, J	10-20	1250	4	Own	4-4¼x5¼	G,K,D	2
Sandusky E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shawnee Com.	6-12	....	2	LeR.	4-3½x4½	Gas.	1
Shawnee Com.	9-18	....	2	Gray	4-3½x5	....	..
Shelby D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby C	10-20	....	4	Erd.	4-4 x6	G or K	2-3
Short Turn	20-40	1500	3	Beav.	4-4¾x6	G,K	3
Steady Pull	12-24	1485	4	Own	4-4 x5	Gas.	3
Stinson 4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Stone	20-40	2250	4	Beav.	4-4¾x6	G,K	4
Tioga 3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Titan	10-20	900	4	Own	2-6½x8	G,K,D	3
Topp B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6-10	....	3	LeR	4-3½x4½	Gas.	2
Townsend	10-20	895	2	Own	4-6½x7	Ker.	2-3
Townsend	15-30	1485	2	Own	4-7 x8	Ker.	3-4
Townsend	25-50	2750	2	Own	4-8½x10	Ker.	4-8
Traction Motor	40-50	....	4	....	8-3½x5	Gas.	4-5
Traylor TB	6-12	715	4	LeR.	4-3½x4½	Gas.	1-2
Triumph H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar 10	25-40	3750	*2	Wauk	4-5 x6¼	G or K	4
Turner 1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City	12-20	1580	4	Own	4-4¼x6	G,K	3
Twin City	20-35	3175	4	Own	4-5½x6¾	G,K	5
Twin City	40-65	5250	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20-30	1985	4	Beav.	4-4¾x6	G or K	3-4
Universal	1-4	475	2	Own	1-3½x5	G	1
Utilitor 501	2½-4	380	4	Own	1-3½x4½	G	1
Victory 1921	9-18	1350	4	Gray	4-3½x5	Gas.	2
Victory 1921	15-30	1750	4	Wauk	4-4½x5¾	Gas.	3
Vim B	15-30	1650	4	Wauk	4-4¾x5¾	G,K	3
Wallis K	15-25	1600	4	Own	4-4½x5¾	G,K	3
Waterloo N	12-25	1450	4	Own	2-6½x7	G,K	3
Webfoot 53	28-53	5000	*2	Wisc.	4-5¾x7	G,D	6
Wellington B	12-22	....	4	Erd	4-4 x6	Ker.	2-3
Wellington F	16-30	....	4	Chief	4-4¾x6	Ker.	3-4
Western, 1920	16-32	2100	4	Clim.	4-5 x6½	Gas.	4
Wetmore 21-22	12-25	1585	4	Wauk	4-4 x5¾	G,K	3
Wharton, W-E	12-20	1800	3	Buda	4-4½x5½	Gas.	2
Whitney B	9-18	595	4	Own	2-5½x6½	Gas.	2
Wichita T	15-30	2000	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin E	16-30	2250	4	Clim.	4-5 x6½	G or K	3
Wisconsin F	20-40	2450	4	Wauk	4-5 x6¾	G or K	4
Wisconsin, H	22-40	3200	4	Clim.	4-5½x7	G or K	4-6
Yuba 12-20	12-20	2600	*2	Wisc.	4-4½x6¾	G,K,D	3
Yuba 15-25	15-25	3100	*2	Wisc.	4-4½x6	G,K,D	..
Yuba 23-35	20-35	4185	*2	Wisc.	4-5¾x7	G,K,D	4
Yuba 25-40	25-40	4650	*2	Wisc.	4-5¾x7	G,K,D	..
Zelle	12-25	....	4	....	4-4½x5½	G or K	3

ABBREVIATIONS: G—Gasoline. K—Kerosene. D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make: Beav. —Beaver. Clim.—Climax. Cont.—Continental. Dors.—Domas. Evin.—Evinrude. Here.—Hercules. LeR.—LeRoy. Midw.—Midwest. Nway.—New Way. Nor.—Northway. Strns.—Stearns. T.C.—Twin City. Wauk.—Waukesha. Weid.—Weidely. Wis—. Wisconsin. *—Crawler type. All others are wheel type.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Aurora, Ill.	Automobile	Jan. 1- 7
New York	National Automobile	Jan. 7-13
New York	National Body Builders'	Jan. 9-14
Buffalo	Buffalo Automobile Dealers' Assn.	Jan. 14-21
Philadelphia	Automobile	Jan. 14-22
Rochester	Automobile	Jan. 16-21
Tulsa, Okla.	Automobile	Jan. 16-21
Oakland, Calif.	Automobile	Jan. 16-22
Milwaukee	Fourteenth Annual Automobile	Jan. 19-25
San Francisco	Automotive Equipment Exposition	Jan. 21-27
Detroit	Automobile Show	Jan. 21-28
Cleveland	Cleveland Mfrs.-Dealers' Assn	Jan. 21-28
Baltimore	Annual Automobile	Jan. 21-28
Portland, Ore.	Annual Automobile	Jan. 23-29
Montgomery, Ala.	Alabama Automobile Dealers' Assn.	Jan. 23
Binghamton, N. Y.	Binghamton Dealers' Assn	Jan. 23-28
Toledo	Automobile	Jan. 23-28
Allentown, Pa.	Lehigh Automobile Trade Assn.	Jan. 28-Feb. 4
York, Pa.	York County Dealers' Assn	Jan. 28-Feb. 4
Chicago	National Automobile	Jan. 28-Feb. 4
Chicago	Automobile Salon	Jan. 28-Feb. 4
Erie, Pa.	Automobile	Jan. 30-Feb. 4
Scranton, Pa.	Annual Automobile	Jan. 30-Feb. 4
Lancaster, Pa.	Automobile Trade Assn.	Feb. 1- 4
Pontiac	Pontiac Automobile Dealers' Assn.	Feb. 1- 4
Columbus	Columbus Automobile Dealers' Assn.	Feb. 2- 8
Tampa, Fla.	South Florida Fair Assn.	Feb. 2-14
Troy, N. Y.	Eighth Annual Used Car	Feb. 4-11
Youngstown	Youngstown Dealers' Assn.	Feb. 4-11
Scranton, Pa.	Annual Motor Truck	Feb. 6- 9
London, Ont.	Nat'l Motor Show of West Canada	Feb. 6-11
Minneapolis	Tractor	Feb. 6-11
Minneapolis	Automobile	Feb. 6-11
Winnipeg, Can.	Canadian Equipment Assn.	Feb. 6-11
Schenectady	Schenectady Dealers' Assn.	Feb. 6-11
Flint, Mich.	Michigan Automotive Trade Assn.	Feb. 8-11
Kansas City	Kansas City Motor Dealers' Assn.	Feb. 11-18
Atlanta	Southern Automobile	Feb. 11-18
San Francisco	Sixth Annual Pacific Automobile	Feb. 11-18
Kalamazoo, Mich.	Michigan Automotive Trade Assn.	Feb. 14-18
Albany	Automobile Dealers' Assn.	Feb. 18-25
Hartford, Conn.	Hartford Automobile Dealers' Assn.	Feb. 18-25
Bethlehem, Pa.	Automobile and Accessory Show	Feb. 20-25
Louisville, Ky.	Fourteenth Annual Automobile	Feb. 20-25
Syracuse	Fourteenth Annual Automobile	Feb. 20-25
Gr. Rapids, Mich.	Michigan Automotive Trade Assn.	Feb. 20-25
Deadwood, S. D.	Deadwood Business Club	Feb. 21-25
Montreal	Automobile	Feb. 25-Mar. 1
Des Moines	Winter Automobile	Feb. 26-Mar. 3
Bethlehem, Pa.	Truck and Tractor Show	Feb. 27-28
Elmira, N. Y.	Elmira Automobile Club	Feb. 27-Mar. 4
Muskegon, Mich.	Michigan Automotive Trade Assn.	Feb. 27-Mar. 4
Portland, Ore.	Portland Dealers' Assn.	Feb. 27-Mar. 4
Springfield, Mass.	Seventh Annual Automobile	Feb. 27-Mar. 4
Bay City, Mich.	Michigan Automotive Trade Assn.	Feb. 28-Mar. 4
Wichita, Kan.	Wichita Motor Trade Assn.	Feb. 28-Mar. 4
Ardmore, Okla.	Ardmore Automobile Dealers' Assn.	March
Galesburg, Ill.	Galesburg Automotive Dealers' Assn.	March
Madison, Wis.	Four Lakes Bldg.	March
San Antonio	Automobile Trades Assn.	March
St. Louis	Manufacturers' and Dealers' Assn.	March
Brooklyn	Eleventh Annual	Mar. 4-11
Saginaw, Mich.	Michigan Automotive Trade Assn.	Mar. 6-10
Indianapolis	Annual Automobile	Mar. 6-11
Nashville	Nashville Automobile Trades Assn.	Mar. 6-11
Wilmington, Del.	Wilmington Trade Assn	Mar. 6-13
Denver	Denver Automobile Trade Assn.	Mar. 10-20
Boston	Annual Automobile	Mar. 11-18
Newark, N. J.	Newark Automobile Dealers' Assn.	Mar. 11-18
Boston	Automobile Salon	March. 13-18
Omaha	Omaha Automobile Trade Assn.	Mar. 13-18
Port Huron, Mich.	Michigan Automotive Trade Assn.	Mar. 15-18
Ypsilanti, Mich.	Michigan Automotive Trade Assn.	Mar. 21-22
Ann Arbor, Mich.	Michigan Automotive Trade Assn.	Mar. 24-25
Ben. Harb., Mich.	Michigan Automotive Trade Assn.	Mar. 28-31
Bat. Creek, Mich.	Michigan Automotive Trade Assn.	April 2- 8

FOREIGN SHOWS

Santiago, Cuba	Annual Automobile	March, 1922
Rio de Janeiro	Automotive Exhibition	September, 1922

CONVENTIONS

Chicago	Am. Road Builders' Conv. and Show.	Jan. 17-20
Chicago	Fifth Annual N. A. D. A. Convention.	Jan. 30-31

DEALERS AID LEGISLATIVE WORK

Montreal, Que., Dec. 16—A meeting of truck dealers and owners was held at the offices of the Automobile Club of Canada recently, at which representatives from the Ford, Pierce-Arrow, Packard, White, International Harvester Co., Maple Leaf Mfg. Co., Gotfredson and Joyce, National Breweries and City Auto Delivery were present. J. A. Duchastel acted as chairman. The question of speed and weights and general legislation for motor trucks operating in this province was discussed at length. A committee comprising Messrs. L. W. Pearson, H. D. Jones, L. M. Hart and George A. McNamee was appointed to meet within a week's time and report to a general meeting of owners and dealers within a fortnight's time.

BETHLEHEM SALE MARCH 15

Philadelphia, Dec. 16—Creditors of the Bethlehem Motors Corp. in the hands of a receiver for a year, will not receive more than 20 cents on the dollar, according to a statement by C. E. Woods, receiver, at a meeting of the creditors in Allentown. The claims total $3,000,000.

FIGURE IT UP
NO EXTRA CHARGE ON LEXINGTON LARK FOR THIS EQUIPMENT.
—ALL OTHER CARS CHARGE EXTRA FOR THIS—
FIGURE IT UP
J.A.CARR MOTOR SALES CO.

Impressing Prospect With Array of Equipment

ONE of the most striking and original displays in Toledo was that of the James A. Carr Motor Sales Co. In front of his establishment Carr placed tables on which was arranged all the equipment which goes with the Lexington Lark model. Attached to each piece was a price tag with the challenge "Figure it Up." The plan brought scores of interested car buyers to his salesroom in the short time that it was exhibited. The large lettered sign compelled attention from persons who passed the salesroom on foot or in motor cars. Carr says he never planned a more effective bit of publicity and the results were well worth the effort